FIRST AERO WEEKLY IN THE WORLD

FLIGHT

FEB 19 1937

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Left: A typical Lockheed Undercarriage Jack

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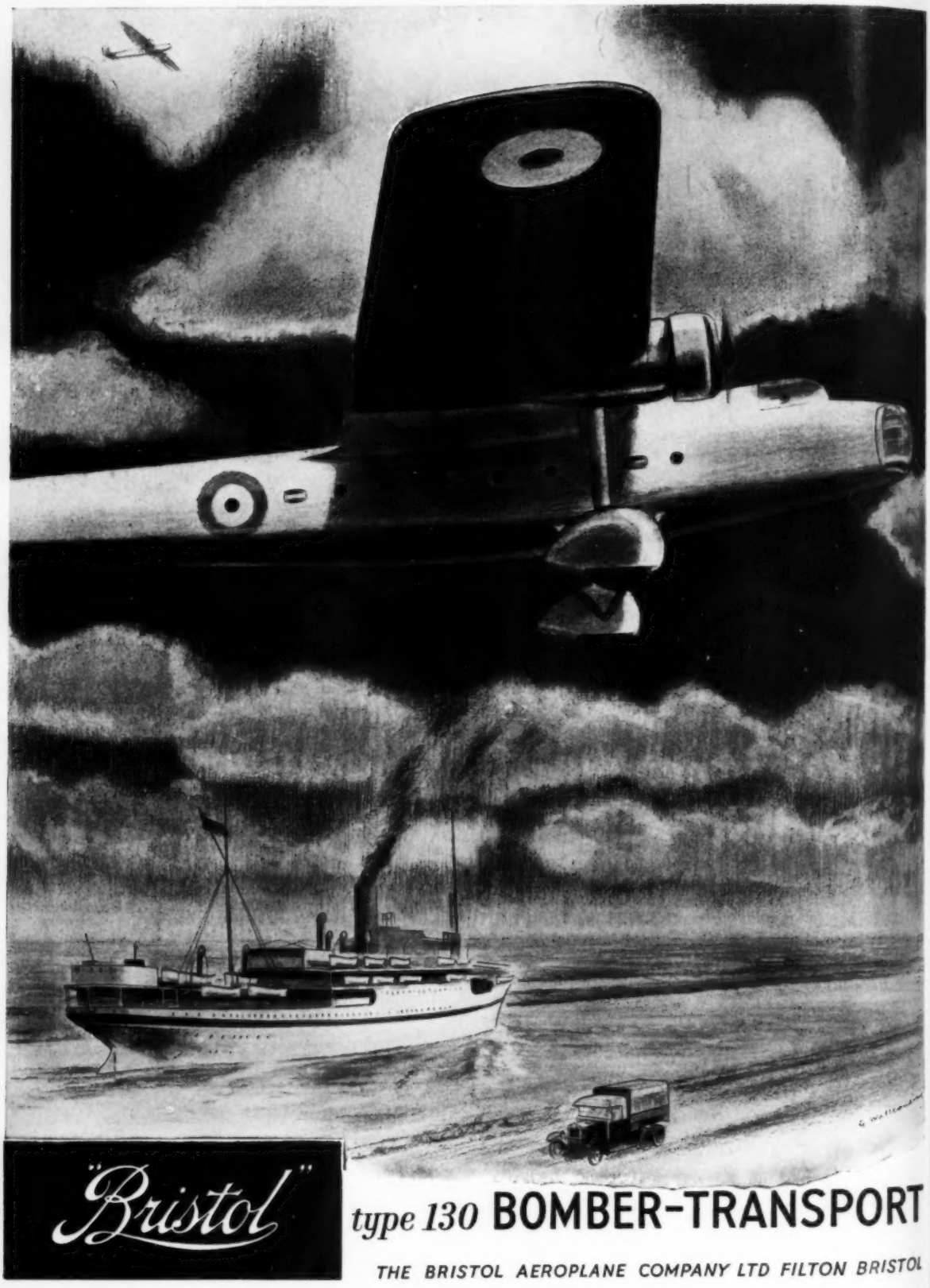
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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Air Defence Debate

FIGURES, it is said, may be made to prove anything, and there was much play made with numbers of squadrons and numbers of aircraft in the debate in the House of Commons on January 27. When juggling with figures, however, it is very important to get the numbers right, and one incorrect figure ran through much of the debate in question, and vitiated a good deal of the arguments. Both Mr. Simmonds, who started the debate, and Mr. Churchill stated (according to Hansard) that in the spring of 1935, when the expansion programme was decided upon, we had 52 home defence squadrons. The figure 52, which both the hon. and right hon. gentlemen must have got into their heads, was the number of squadrons agreed to in the long-ago programme of 1923. Actually that programme was never completed, and by the spring of 1935 the home defence force consisted of 42 squadrons. That is to say, it was 10 squadrons short of the original programme. Mr. Simmonds said that the 52 squadrons had approximately 575 aircraft. Actually the 42 squadrons consisted of 9 squadrons with 10 first-line aircraft apiece and 33 squadrons with 12 apiece, which makes 486 aircraft. Mr. Churchill used the incorrect figure in this way: He said that in 20 months we have had 25 or 26 squadrons; whereas by deducting 42 from his total instead of deducting 52, it seems that we have had 35 squadrons in that time. Sir Thomas Inskip gave the official figures, namely, 87 squadrons formed, of which 13 have only one flight each. That is evidently the total strength, not the number of new formations. The *Air Force List* and Air Ministry Orders only show a total of 77 fighter, bomber, torpedo-bomber, and general reconnaissance squadrons in this country. If the five flying-boat squadrons are added, the total comes to 82. Perhaps some little bird from the Air Ministry told Sir Thomas of five more squadrons whose existence has not yet been made public.

Another point, which was mentioned in the debate but was not taken into account throughout, is the increase in the numbers of machines per squadron. The programme is to make up a total of 1,750 first-line aircraft, which according to the old reckoning would have equipped so many squadrons. The Air Ministry is still aiming at that figure of 1,750 aircraft, but they will now not make up so many squadrons as was at first reckoned. Therefore, the wrangling about our arrears in numbers of squadrons was partly off the point.

The Lag

Everybody, and not least Sir Thomas Inskip, admits that the programme for the production of airframes is some months behindhand, but not to the extent made out by some of the speakers in the debate. In the days of unilateral disarmament *Flight* frequently warned the Government that, by starving the aircraft firms and making it impossible to hold together their trained staffs, it was running a risk that when the time should come for a rapid large increase the firms might not be able to adapt themselves to the changed conditions in a minute. That is what has happened. Since the announcement of the expansion programme everything possible has been done by all concerned, and nobody can be blamed for the lag. It has taken the firms, or at least some of them, a longer time than even they anticipated to get their factories into order for mass production. As an example of what can be done when works are in proper order, we may instance the way in which the "C" class flying boats have been streaming out of the Short seaplane works at Rochester since the launching of Canopus. The Harrows, we feel sure, will soon be pouring out from Cricklewood in a similar manner, and when the other firms have completed their preparations the increase all round should be very rapid indeed.

Mr. Simmonds spoke of "this surpassingly serious situation, this potentially perilous situation" (to round off his alliteration he ought to have used the word "position" in the second case), and evidently wanted

FOR YUGO-SLAVIA : Despite the enormous amount of work created by the expansion of our own Air Force the industry is still able to cope with orders from abroad. This aerial photograph shows one of a batch of the latest Hawker Furies for Yugo-Slavia. Fitted with a Rolls-Royce Kestrel XVI and Dowty cantilever undercarriage it has a speed of 250 m.p.h. (*Flight* photograph.)

to make people's flesh creep. To some extent it seems that he has succeeded, and perhaps there is no great harm in that. There may be an unpleasant surprise for income-tax payers in the next Budget, and it may reconcile them to the unpleasantness to think how very much more unpleasant it would be to be bombed. It is usual for insurance companies to display posters of houses on fire so as to induce citizens to take out policies.

It may sound paradoxical to say that air defence is a subject which is indivisible but is divided, yet that would only state the case. Hence the complication that in Parliament an hon. member, when discussing the home defence Air Force, is out of order if he mentions the Territorial Army. Sir Murray Sueter was the only member bold enough to defy this rule in the defence debate, and he is evidently a privileged person, for the Deputy Speaker allowed him to ramble round Malta, and he also poked into the office of the "Defence Minister," as he called Sir Thomas Inskip. Yet he came to ground, literally and metaphorically, with sound common sense when he urged that it was high time that the whole defence of London and our big cities was placed under the Air Ministry—and he was not called to order. There we have a matter of the utmost importance, for without very smart co-operation between the ground troops and the fighter aeroplanes the enemy raiders are likely to make an easy untroubled journey to London, and all the mass production and shadow industries in the world will not stop them. Yet Sir Murray was the only member who took up this vital point in the debate. Sir Thomas Inskip "believed" that our anti-aircraft defences are the very best that can be devised from the point of view of the guns, the searchlights, the instruments, and the methods of detecting aircraft. It is most comforting to hear that, for a very few months ago the very reverse was the case, and the guns and the equipment were about due for admission to some museum.

Why, we should like to know, does not some M.P. call for a Government statement showing the progress in re-equipping the ground troops of the air defence organisation with new arms and instruments?

THE HONOURS LIST

IN the first Honours List of the Reign of King George VI there appear the following names of persons connected with civil and military flying. Mr. H. T. Tizard, who has been created a K.C.B., has been chairman of the Aeronautical Research Committee since 1933 and is Rector of the Imperial College of Science and Technology. On page 126 are listed other honours granted to officers and men of the Royal Air Force. Among the officers who are awarded the Air Force Cross are Sqn. Ldr. F. R. D. Swain, who regained the altitude record for Britain, and Flt. Lt. C. F. Uwins, chief test pilot of the Bristol Company.

Baronet

Sir Derwent Hall Caine, M.P.

M.V.O. (Fourth Class)

Wing Commander Edward Hedley Fielden, A.F.C.

C.B. (Military Division)

Air Vice-Marshal William Lawrie Welsh, D.S.C., A.F.C.
Air Commodore Arthur William Tedder.

K.C.B. (Civil Division)

Henry Thomas Tizard, C.B., A.F.C., F.R.S.

M.B.E. (Military Division)

Quartermaster and Hon. Flight Lieutenant Hugh Cully, Royal Australian Air Force.

M.B.E. (Civil Division)

Arthur Reginald Tooke, Officer Supervisor, Headquarters, R.A.F., India.

Charles Bennett, Acting Senior Contract Officer, Air Ministry.

C.B.E. (Military Division)

Air Commodore James Bevan Bowen, O.B.E.

British Empire Medal (Military Division)

Leading Aircraftman Harold Edgar Gundry.

The Outlook

A Running Commentary on Air Topics

Keeping Them Up

A PLAN for bringing the unapproved firms directly into the expansion scheme was put forward by Lord Sempill in the debate in the House of Lords on December 17 last year. The Secretary of State for Air, Lord Swinton, misunderstood this and other parts of Lord Sempill's speech, and said, somewhat rudely many thought, that he had no intention of abandoning the "Shadow Scheme" for any of those Lord Sempill had put forward. In point of fact, Lord Sempill did not suggest anything of the kind, but however that may be, evidently his outline of bringing approved and unapproved firms closer together did not find favour.

During the debate in the Commons last week, Mr. O. E. Simmonds made what appears to be a very sensible suggestion. Looking ahead, he pointed out that with relatively inexperienced pilots on the new fast types of aeroplane now being produced, the number of crashes was likely to be large. Hitherto the manufacturer has, in the case of a fairly extensive crash which could not be repaired by the squadron, carried out the necessary repairs. Mr. Simmonds suggested that in future the manufacturers will not wish to have their production flow interrupted by having to do repair work, and that it might be a good plan to select a number of unapproved firms.

That there are certain difficulties in the scheme may be admitted, but they should not be insurmountable. The manufacturers would have to supply the "Approved Unapproved Repair Companies" with parts such as spars, ribs, longerons and so forth, otherwise the repair firms would need to set up rolling and drawing mills and other machinery, but provided the parts were supplied, there should be no great difficulty.

World's Records

IT is now a good many years since the French Air Minister of that time, M. Laurent Eynac, delivered the dictum that a nation's air publicity is its world's records. The details published recently of the prizes which the French Government is offering for the establishment by a French pilot of new world's records is an indication that the present Socialist Government of France agrees with M. Laurent Eynac in his views of the importance of a nation holding world's air records. The records for which it has decided to award prizes are: The out-and-out speed record over a measured course, the speed over 2,000 km. with useful load of 1,000 kg. and 2,000 kg., and speed over 5,000 km. course without useful load. That the French Government is very much in earnest concerning these records is proved by the fact that the total amount of prizes offered is no less than 2,750,000 francs.

It is perhaps significant that included in the class of record for which prizes are offered, one does not find the altitude record nor the straight-line distance record. It is known that the French pilot, Detre, has his eyes on the former, and is likely to make an attempt before very long, while the latter is already held by French pilots, i.e., Codos and Rossi.

The offer of the French Government is open until May 30 of this year. Doubtless we shall see a number of French attempts made on the records mentioned before that date, and it would be well for Great Britain not to overlook the importance of world's records, particularly at the present time, when aeronautical prestige counts for a good deal. At present the only record held by this country is the altitude record.

New York—Paris

THE wheels of the New York-Paris Race organisation are beginning to "rev up," and the first British entry was received last week—a Burnelli Clyde Clipper with two Rolls-Royce Kestrel XVI engines giving a cruising speed of about 225 m.p.h. There are three official French Air Ministry entries so far, the Marcel Bloch with four Hispano-Suiza engines, the Amiot mail-carrier as shown at the Paris Show, but with a third engine fitted in the nose, and the Makhonine with retractable outer wing panels. It is reported that one of Signor Mussolini's sons may enter.

The first prize is £15,000, and the second and third are £10,000 and £5,000 respectively; total prize money of £30,000 is no mean reward even if a different division is decided upon. The regulations are designed to cause as little difficulty to the competitors as possible; in fact, the main articles merely stipulate a qualified pilot and wireless operator to fly the aircraft, which itself should have plain markings on air-frame and engine and large identification symbols. These, together with full radio equipment and 5,000 francs for the entrance fee, complete the requirements. Competitors are asked to arrive at New York a few days before departure to allow time for the aircraft to be inspected.

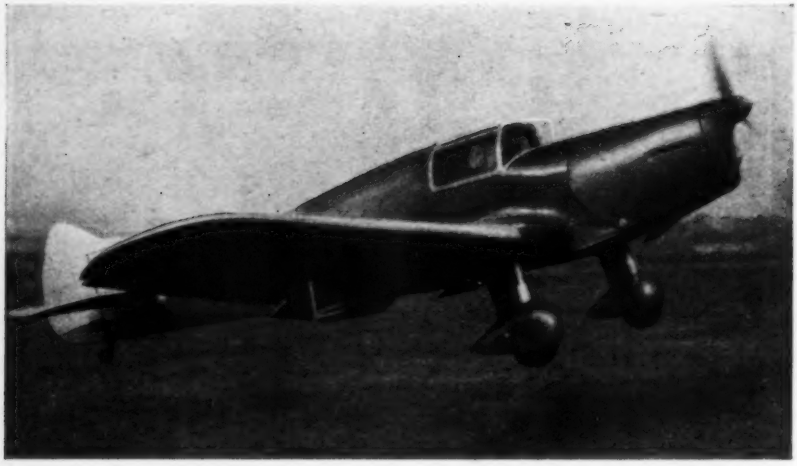
The remaining regulations are, roughly, "play the game" and "bring who you like." The take-off and landing grounds will be announced shortly. These will almost certainly be the Floyd Bennet airport and Le Bourget for aeroplanes and a reach of water near New York and a stretch of the Seine near Paris for seaplanes.

Plastics

DR. NORMAN DE BRUYNE deserves to go down in aviation history for two things: his paper on plastics and his remark, which deserves to become a classic, that "It is better to have blundered than never to have thought at all." But for the moral courage expressed in that sentence we might have had to wait for years before being told anything about the progress made with the application of plastics to aircraft structures. That Dr. de Bruyne did not wait until everything connected with this subject was cut and dried is to his very great credit, and even if he does, at some future date, as he himself put it, "have to eat his words," he has made people think of plastics, and he has given them a very good idea of the immediate prospects.

To summarise the present position, one might, perhaps, say that already it is proved that synthetic resins, suitably reinforced, can be used with advantage for certain parts of an aircraft structure and probably for airscrews. That in sheet form it can replace plywood if the cements used to glue the joints together can be definitely proved to be strong and lasting enough.

A good many years ago an American firm introduced a material which was given the trade name Plymetl. This material consisted of a layer of wood or plywood sandwiched between two layers of sheet aluminium or duralumin. It does seem possible that a modern version of that scheme could conceivably take the form of two layers of synthetic resin sheet with balsa wood between them. In that case, the glued or cemented surfaces in contact would be very large, and unless the very porous nature of the balsa wood in conjunction with the hard smooth surface of the resin cause cementing troubles, a system might result which would be good both structurally and for absorbing noise and vibration.



THE MILES WH

A Wide Speed Range, Vic... in the Latest Addi... Flying a Mac...

By H... O.
Illustrated ...

(Left) The Whitney Straight being pulled off the ground with the flaps half down. (Centre) The designer—Mr. F. G. Miles. Another photograph of the machine appears on page 119.

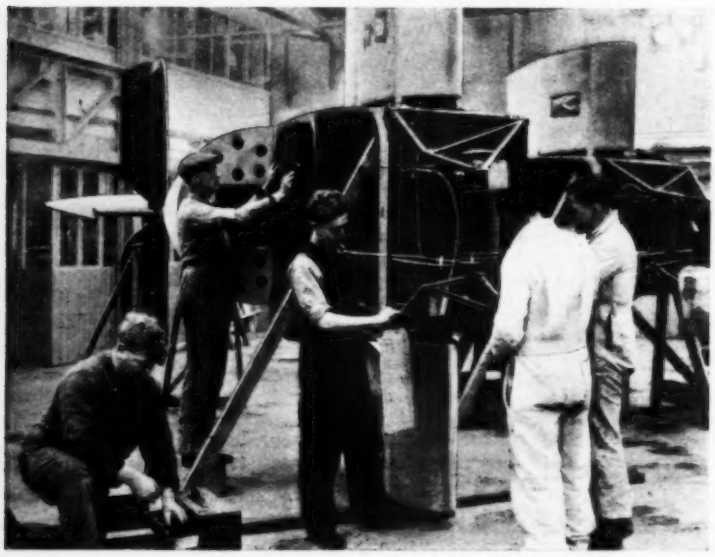
EVEN the few enthusiasts who had a chance of flying with Mr. Miles many months ago in the prototype should be agreeably surprised after a few circuits in the final and irrevocable production model of the Miles Whitney Straight. And those who always expect the impossible from an ideal light aeroplane will not find much of which to complain. We have all been waiting a long time while improvements and alterations were being made, but the production model, it seems, is likely to make this wait worth while.

Nothing in this world is perfect—and certainly no vehicle, whether on land, on sea, or in the air, can ever be foolproof. But within the limits imposed by present-day knowledge of aircraft design the Miles Whitney Straight appears to be the last word in viceless compromise. It is fast for its power and accommodation, yet it lands at something rather less than 40 m.p.h. and can be flown in any reasonable attitude at its slowest speed without evincing any noticeable tendency to turn and bite.

It will stall—an undisturbing business, which is announced by gentle shudders and, sometimes, by a kick of aileron—and, like everything else with wings, it will probably spin. But I should hate to supply the superhuman provocation in the matter of loading and control movement necessary to produce this second effect. Without such provocation it would seem that the very worst result of chronic mishandling by a moron novice would be a graceless and expensive descent, on a more or less level keel, into the ground, or a 40-m.p.h. collision with some continuously visible object.

Nor let me risk the raucous laughter of the cynics by saying that any fool can fly it. Like every other aeroplane—and perhaps *more* than any other—the Straight requires knowing before the best results can be obtained. Without forewarning, the machine can be flown like any other, but the knowledge necessary for obtaining these better results is of a mental rather than a manual kind. It can be piloted more or less successfully by the book (pressing, so to speak, buttons "A" and "B") and by the exercise of normal height-and-distance judgment which can only be obtained by experience. In so far, the operation resembles that of driving a car, though while on the ground the newcomer must learn to steer with his feet; in the air he can forget these clumsy extremities.

Before taking the machine up to see for myself, I witnessed two interesting performances—one from the ground and the other from the passenger's seat. In the first a man who had had a great deal of flying experience, but who had never actually touched the controls of any aeroplane, was being given a try-out. His first two landings would have been



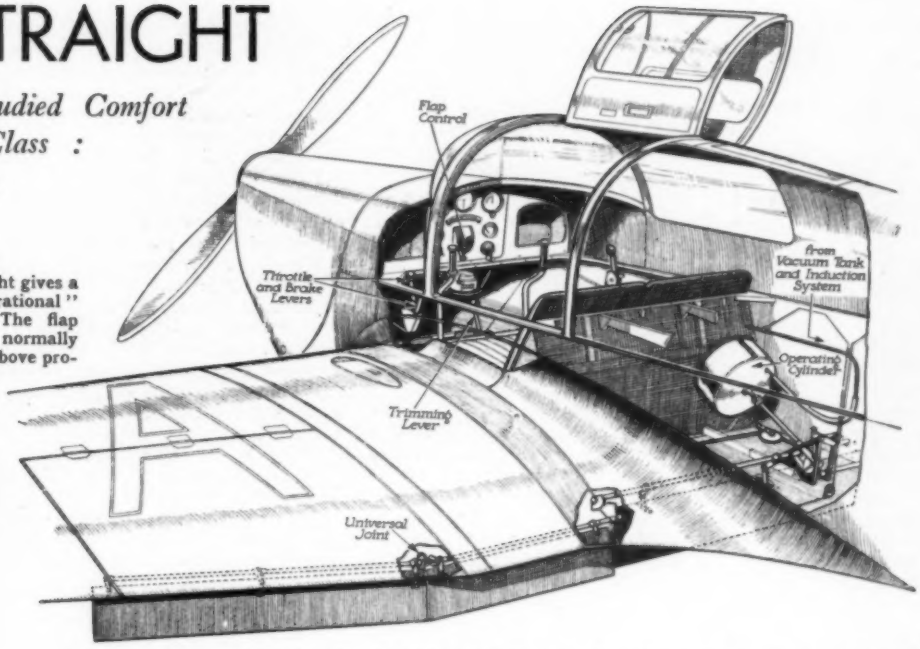
An interesting feature of the Straight production line at Reading: At one period during erection the machines are laid out on their sides so that undercarriage, flap-gear and other details may be more easily installed.

LES WITNEY STRAIGHT

ange, Vi[ch]aracteristics and Studied Comfort [for] test Addi[tion] the Owner-Pilot Class : g a Mac[hine] Dual Personality

By H[ERBERT] TAYLOR
Illustrated [with] "Flight" Photographs

The line drawing on the right gives a good impression of the "operational" layout of the machine. The flap operating gear is, of course, normally covered and the large area above provides accommodation for a maximum of 160 lb. of luggage and incidentals.



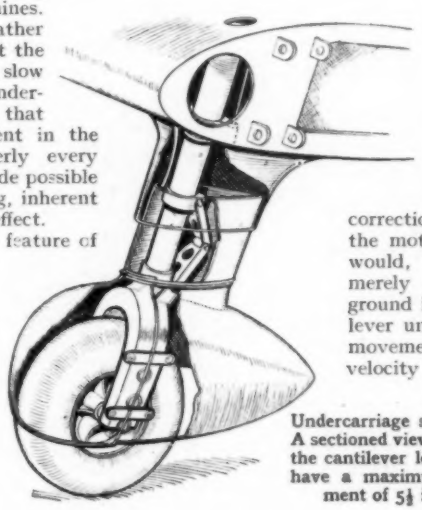
wreckers without the help of a burst of motor applied by Mr. Miles after the impact; his third was very fair, and certainly safe. On this third round he took off, made a circuit, closed the throttle, and landed without any assistance other than verbal (and little of that). His departure left a zig-zag pair of wheel-tracks, and his arrival was off-wind—results largely of an inability to use the unnatural rudder control.

In the second performance Mr. Miles showed me just what *could* be done with impunity. I was frightened most of the time—but I should have been dead after being frightened in the majority of machines. His hands-and-feet-off landing is a rather obvious trick, but it does show that the machine is extraordinarily stable at slow speeds in all three axes, that the undercarriage will take its medicine, and that Mr. Miles is encouragingly confident in the machine's ability to do it properly every time. It is, as may be imagined, made possible by a combination of skilful trimming, inherent stability, and low-wing cushioning effect.

To the pilot the most remarkable feature of the machine is its wide range of approach angles. When making about eight or ten approaches I closed the throttle while flying down-wind, while approaching up-wind and nearly over the aerodrome boundary, and while travelling at cruising speed with the aerodrome almost out of sight in the prevailing bad visibility. In each case I got into the aerodrome quite comfortably with the exercise of normal powers of judgment and while making full use of the machine's Jekyll and Hyde characteristics. On the final four attempts I pulled off unassisted spot landings just over the marker boards. Incidentally, it was not until later that I discovered that this particular "spot" was about the roughest part of the aerodrome—a sufficient tribute to the excellence of the undercarriage.

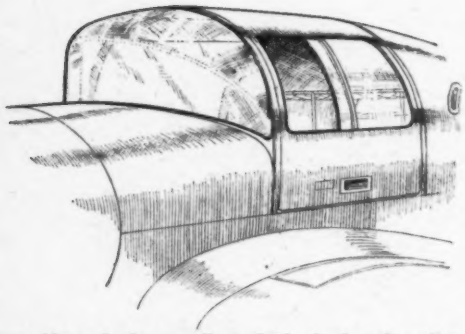
This range of angles is a product not so much of the use of the flaps in either position, but of the machine's gliding characteristics at different speeds. The slower the glide the steeper the approach. If, during a straight, fully flapped approach at 60 m.p.h., it is seen that the aerodrome is being overshot, all the pilot does is to ease the stick back a little until the machine is sinking rather than gliding—and yet sinking under full control. At the lowest limit, 40 m.p.h., and gliding into anything of a normal breeze, the approach angle appears to be of the order of one in one.

The danger of making too great a use of this very steep approach is one of undershooting, since height is rapidly lost, particularly during the final semi-dive to gather a little safe speed for the hold-off and landing. While it is possible to land straight off a 50-m.p.h. approach, a little more speed is desirable if minor misjudgments in hold-off are to be counteracted and if full aileron control is to be retained for bump-correction near the ground. Needless to say, the motion of holding-off at, say, 42 m.p.h., would, while momentarily lifting the nose, merely precipitate the machine into the ground in a level attitude. Though the cantilever undercarriage legs have 5½ in. of useful movement and are designed to take a vertical velocity of 15 ft./sec., such a performance is not to be recommended.



Undercarriage simplicity: A sectioned view of one of the cantilever legs, which have a maximum movement of 5½ inches.

If there is doubt about the machine's ability to reach any particular aerodrome or field, the flaps need not be lowered at



Some idea of the excellent field of view for pilot and passenger, and the clean lines of the one-piece windscreen may be gathered from this sketch.

once, and in a very strong wind it is probably better to use the half-way position throughout the approach. Unflapped, the Straight has the flattest of glides. In this connection, two points are worth mentioning.

The flaps are pneumatically operated by Simmonds-Theed control with a vacuum tank in the circuit; in the half position the outer portions move down, while in the full position these portions are balanced by the section beneath the fuselage, this section being hinged at the rear. For purely mechanical reasons it is not possible to move the flaps from the full to the half position, and if the pilot wishes to retract them partially he must first move the finger-light dash lever into the "off" position. In the other, and more usually necessary direction of application, he can obtain both positions in sequence. The second point is that, if the engine stops, the vacuum tank will perform two complete flap movements under load, so that, if the worst comes to the worst, a forced landing glide may be stretched. The use of the flap control for such a purpose is not recommended in the ordinary course of events for reasons, mainly, of stalling-speed alteration and of slight changes in the gliding characteristics.

Contrary to the statement in the preliminary leaflet, the flaps do *not* come up of their own accord when the throttle is opened fully for a second approach attempt, but the machine flies and climbs quite normally, though at very low speeds, with the flaps down; in these circumstances the best climbing speed is as low as 45 m.p.h. I did one flap-down take-off and found that the run was very little longer than normal, though the air speed indication afterwards showed no tendency to rise and the machine felt as one on which the revolutions had suddenly dropped. If, by any chance, a take-off is accidentally started with the flaps right down, the fact is made obvious before flying speed is reached by a sudden release, at about 30 m.p.h., of the load on the stick, which is still being held forward—an effect probably caused by reflected downwash.

Special Technique

Although the actual take-off run is not appreciably shortened by using the flaps in the half-down position, this position can be used for small-field work, provided that the technique is thoroughly understood and practised. In short, the effect is one of providing flapped characteristics without suffering any marked drag. With the flaps down, considerably greater liberties can be taken at low speeds and the stalling speed is, too, slightly lower.

In normal flight one develops the habit with the Straight of placing the feet firmly on the floor and of ignoring the rudder. Perfect turns can be made on the stick alone, and even steep turns can be changed over without any marked movement of the lateral bubble from its central position, provided that the manœuvre is carefully carried out. The ailerons are particularly smooth, effective and light, and semi-aerobatic flying is made very pleasant indeed. Minor corrections in course and lateral level can be made on the rudder alone (while eating one's lunch or working a C.D.C.), and in smooth air the machine will probably fly more or less indefinitely hands and feet off—though a period of 4½ minutes was the longest during which I found myself able to leave the machine alone. The ability in my case was limited by visibility and a consequent fear of losing myself in the Reading area. Cabin silence nowadays is expected rather than praised, and the Straight is well up to standard in this respect.

Familiar Miles construction is used throughout the wooden air frame and, apart from the special care exercised in both internal and external work, there is nothing out-of-the-ordinary about the machine.

The engine cowling is a centrally hinged two-piece affair and either side may be propped up by two struts which normally lie in a clip along the top engine bearer; this little feature should save a fortune in hat cleaning. The normal tank capacity is thirty gallons, providing a still-air range of 570 miles, but special tanks, carrying a total of forty-five gallons, can be fitted if desired. A single electric dash-gauge is used for reading off the contents of either tank at will.

While in flight the range of vision from the cabin is exceptionally good, and is limited only by the nose and the low wing. Before opening up for the take-off the sky behind can be examined without difficulty or neck strain, and the one-piece Perspex windscreen gives one as much general forward vision as is humanly possible in any nose-engined machine. Whether or not this somewhat expensive moulding will require replacement after, say, a year's flying remains to be seen.

THE MILES WHITNEY STRAIGHT
130 h.p. D. H. Gipsy Major Engine

Span	35.8 ft.
,, (wings folded)	17.2 ft.
Length	25.0 ft.
Height	6.6 ft.
Cabin width	43 in.
Weight, empty	1,250 lb.
,, loaded	2,000 lb.
Maximum speed	145 m.p.h.
Cruising speed at 1,000 ft. and 2,100 r.p.m.	130 m.p.h.
Stalling speed (flaps down)	38 m.p.h.
Range in still air (standard tanks)	570 miles
Take-off run (5 m.p.h. wind)	145 yds.
Landing run (5 m.p.h. wind)	100 yds.
Initial rate of climb	850 ft. min.
Price ex works	£985

Distributors: Whitney Straight, Ltd., Brettenham House, Strand, London, W.C.2.

Behind the wide one-piece seat there is a vast area for luggage accommodation, complete with straps, and on the rear bulkhead there is a hat rack. This will undoubtedly be used for a host of oddments which cannot comfortably be kept in the two cubby-holes in the dash.

It is difficult to see how entrances and exits can be made easier in the low-wing type of machine in which the occupants are placed well forward, but, with a pair of control columns and what not, the job is somewhat contortionist. Furthermore, an inexpert passenger will undoubtedly place muddy shoes on both seats at least once before he or she is finally in place. In this connection one wonders why the door-cum-roof is on the port side. Nobody cares about the pilot's feelings, but everyone cares about those of a passenger—particularly one who has never flown before—and it is the pilot who usually stays in his place. The pilot, too, will soon learn to enter gracefully, and will be less likely at any time to put his foot through fifteen pounds-worth of compass and dashboard. When closed, the top is brushing the pilot's hat (for the short pilot will probably demand a cushion in order that he shall have the maximum visibility), but this is probably an advantage, inasmuch as there is a shorter body movement in an unexpectedly bad bump.

These, however, are very small points of criticism when examined beside the remarkable efficiencies of this new private-owner type. Even at its comparatively high price, it is likely to hold a definite place for itself during the next year or two. Then, perhaps, the Miles Whitney Straight II will be coming along.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

EAST INDIAMAN

A Martin bomber (two 800 h.p. Wright Cyclones) supplied to the Dutch Government for service in the East Indies. The maximum speed is in the region of 230 m.p.h.

ON Thursday, February 11, Messrs. F. W. Meredith and P. A. Cooke will read a paper before the R.Ae.S. on "Aeroplane Stability and the Automatic Pilot."

The paper will be fully illustrated and is to be delivered at 6.30 p.m. in the lecture hall of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C.2.

Over fifty machines have been exported to Brazil, South Africa and Uruguay by the Bucker Aeroplane Co., of Rangsdorf, Germany, during the past twelve months.

The place of Councillor R. Ashley Hall, as chairman of the Aerodrome Owners' Association, has been taken by Councillor J. W. Bateman, of Hull. The new vice-chairman is Mr. C. M. Newton, a director of Sywell aerodrome, and the secretary is Capt. H. R. Gillman.

Twenty-five Years Ago

(From "Flight" of February 3, 1912.)

"Mr. Cody must also be congratulated on his success in the friendly 'dust-up' between his 'cathedral' and the silenced aeroplane produced by the Army Aircraft Factory. The pilot of the Army flyer was Mr. De Havilland, and over the course of about a mile and a half he was beaten by about a couple of hundred yards. . . . The two flyers were started by the falling of a flag, and an interested observer at the winning post was Mr. Harold E. Perrin, Secretary of the Royal Aero Club."

The latest Douglases of the D.C.3 series delivered to United Air Lines have been christened "Skylounge Mainliners." They have two Pratt and Whitney Twin Wasps, giving a maximum of 1,150 h.p. each, and carry their fourteen passengers in unusual comfort.

Three types of Armstrong Whitworth Whitley, each with Tiger engines, have been designed.

The Airspeed advanced twin-engined trainer (two Cheetah IXs with D.H. v.p. airscrews) has been christened Oxford.

It is rumoured that Westland Lysander monoplanes will be constructed under licence in Canada, possibly for general purpose duties.

The 29th annual general meeting of the Institute of Metals will be held in the Hall of the Institution of Mechanical Engineers, Storey's Gate, Westminster, London, S.W.1, on March 10 and 11.

A total of 1,189,000 pounds of air mail was carried by Canadian aeroplanes during 1935-36. This is a record.

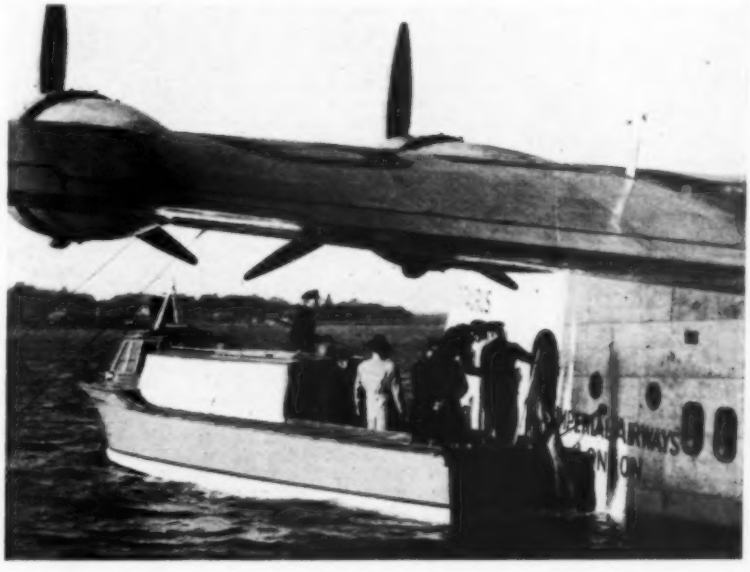
A mission comprising fourteen officers on the staff of the German Air Ministry will leave Berlin for Japan in about four weeks' time.

At a meeting of the Segrave Trophy Awarding Committee last week it was decided that the trophy should go to Miss Jean Batten for her Auckland flight.

About a hundred aircraft are taking part in the exercises to test the newly established defences of Singapore, which began on Monday.

A memorial to the late M. Edouard Nieuport, who was killed in an accident in 1911, has lately been erected and unveiled by the Aero Club of France at the entrance to the aerodrome at Villacoublay, near Paris.

The Gee Bee monoplane *Q.E.D.*, which set hearts fluttering at Mildenhall in '34, is for sale. A few of the claims made are: Top speed 240 m.p.h.; landing speed with flaps, 69 m.p.h. (without flaps, 90 m.p.h.); cruising range 2,000 miles, and useful load 3,188 lb. The machine has flown a total of 237 hours.



CENTAURUS SETS OUT: Loading up at Hythe, Southampton, for the inaugural Empire service. Passengers are boarding the machine from one of Imperial Airways' new 37ft. 6in. tenders supplied by the British Power Boat Company. The photograph, incidentally, gives an interesting close-up of the flying boat's wing, with its flap.

AIR DEFENCE

British Progress Criticised in the Commons : Mr. O. E. Simmonds, Mr. Winston Churchill and Sir T. Inskip Give Different Figures : Vulnerability of Factories and Power Stations

THE opportunity afforded by a private member's motion to hear of the progress made with the R.A.F. expansion was taken in the House of Commons on Wednesday of last week, when Mr. O. E. Simmonds, Member for the Duddeston Division of Birmingham, moved:—

"That this House, while endorsing the Government's programme for air defence, urges that the power of this country to resist air attack continues to be inadequate, and emphasises the need for increased organisation both to accelerate the production of flying and ground equipment and to protect the lives of the people."

Members who took part in the debate included Capt. H. H. Balfour, Member for the Isle of Thanet, Wing Cdr. Wright, Member for the Erdington Division of Birmingham, Mr. F. Montague, Member for Islington and Under-Secretary of State for Air in the Labour Government, Sir Thomas Inskip, Minister for the Co-ordination of Defence, Mr. Winston Churchill, and Rear Admiral Sir Murray Sueter.

In examining that part of the motion which urged that the power of this country to resist air attack continued to be inadequate, Mr. Simmonds said it was necessary to go back to May 22, 1935, when was announced in the House the Government's determination to increase the strength of the Royal Air Force. In the Supplementary Air Estimate of July 10, 1935, the following sentence occurred: "to undertake a further scheme for the expansion of the R.A.F." The scheme provided for the formation of 71 new squadrons for home defence by March 31, 1937. This would bring the number of squadrons in this country, excluding the Fleet Air Arm, up to a total of 123 with a first-line strength of approximately 1,500 aircraft.

Figuring it out

Mr. Simmonds then proceeded to explain how he had arrived at certain figures from studying the monthly Air Force List. This showed that in the last four months of 1935, the first months in which the expansion programme to the 71 squadrons began to appear in the List, ten new squadrons were added. During 1936, 22 more were added, and although he might not be quite up to date, because one could not know the squadrons of the last few weeks until the new List appeared, there were definitely two and possibly one or two more squadrons that had been formed in 1937. It was, therefore, clear that since May, 1935, they had 34 additional squadrons out of the 71 due for March 31, 1937. He had prepared a complete tabulation of all the squadrons formed since May, 1935, and stated that this showed at a rough average that after six months of the first date of entry of the squadrons in the Air Force List the flying personnel was approximately 50 per cent. of full strength. That would mean that the 22 squadrons added during the last twelve months might be regarded as effectively equal to 11 full-strength squadrons. To obtain a fair figure, therefore, they had to reduce those 34 squadrons to the equivalent of 23 squadrons at full strength.

In view of the fact that the strength of some of the squadrons had been increased from 12 to 14 machines, in fighter squadrons, and if it was assumed that, on an average, the strength of the squadrons since May 1935, had been 15 per cent., then they were adopting a very optimistic figure. Thus, if the 23 squadrons which they had arrived at were increased by 15 per cent. to 26 squadrons, he thought they were not far wide of the mark. Of the 71 new squadrons due in nine weeks from that day, they had 26 and still lacked 45. It had taken 20 months to get these 26 squadrons, so that at the same rate the remaining 45 squadrons would take approximately three years. If they doubled the rate of output it would take nearly one and a half years, and if they trebled that rate it would take one year. He came to the unpalatable conclusion that, so far as the Air Force List showed a true picture, the expansion programme was somewhere between one and two years in arrears.

Mr. Simmonds then turned to the subject of Germany's air strength. A friend of his had just returned from Berlin and had told him that to-day there were roughly 150 service German aerodromes and that at each aerodrome there must be about 100 'planes. That would mean that in total, including training machines, the German Air Force would have something like 15,000 machines. That sounded an astronomical figure, but from what he himself saw on a visit to Germany fifteen months ago he did not think it an improbable figure. If they took the extraordinarily low figure of 20 per cent. of that total as being first-class modern aeroplanes they arrived at a figure of no fewer than 3,000 first-line modern German aircraft. Mr. Simmonds then referred to the efficient modern twin-engined bombers of the Junkers Ju.86 type capable, he understood, of a top speed of 217 m.p.h. This machine, he said, was now being built in vast quantities by the makers and sub-contractors.

Trying to find the reason for the deficiency in the expansion scheme, Mr. Simmonds asked whether it was due to difficulty of getting pilots. On November 10 the Minister for Co-ordination of Defence had said that over 2,400 pilots had been accepted for training since May, 1935, the pick of over 12,000 definite applications. No shortage had yet been experienced. Mr. Simmonds pointed out that the Air Force List showed that 382 of those new pilots had actually passed into squadrons, so, unless the realisation of the programme was from the very start an impossibility, it could not be the pilots who were responsible. Was it the machines? Here it seemed from Ministerial declarations that they were nearer the mark. The aircraft industry was at full throttle, but the shadow industry was already casting its shadow across the present aircraft production programme. Mr. Simmonds then read extracts from a letter which he had received from the managing director of an important contractor to the present defence programme. According to this letter the firm in question had been badly hit in the last few months, due to a firm which figures in the expansion scheme having taken some eleven men from the contractor's staff of jig and tool craftsmen and paying them upwards of £2 per week more than they were paying them. In consequence the work on which they were engaged had fallen considerably behind. On making representations to the Air Ministry, the firm had been informed that the Ministry was unable to do anything in the matter. Mr. Simmonds asked the Minister for the Co-ordination of Defence whether he would see that there should be no more dislocating of the production of his present contractors in order that the shadow scheme might get under way in a few years' time.

Repairing the Damage

Mr. Simmonds thought the most urgent change in the organisation related to that which he called primary supplies. In the aircraft industry the Government had properly insisted that supplies should only be drawn on in this country. He thought that for a short period, until the manufacture of raw materials, jigs, tools, and machinery could be increased, the normal suppliers of those products should be permitted by the Government to import from the best sources abroad.

Other points raised by Mr. Simmonds included the problem of repairing crashed aircraft, which he suggested should be handled by some of the unapproved firms which were lacking work, instead of by the manufacturers; the question of air attack on the London Docks; and on the safer siting of fuel supply stores and aircraft factories. In the last connection he said that in the Austin shadow factory, outside Birmingham, they had 17½ acres under one roof. A factory 25 miles outside Berlin, employing 7,000 hands on aircraft, had each building at least 250 metres away from the adjacent one.

Capt. Harold Balfour, who seconded the motion, pointed out that in the last war aircraft flew at about 80 m.p.h., whereas now they would fly three times as fast, so that there would be only 15 minutes' warning for London from the time they crossed the coast. It was the responsibility of the Government to make the nation air conscious, and he suggested that every boy, on leaving school, should have a State-aided opportunity of going into the air at least once.

Capt. Balfour said that we must depend for our technical

efforts on the ability to strike at any attacking force that might try to raid these shores. He did not think they ought to turn their back on the possibility of buying foreign aircraft —say, from America—for the next year and a half in order to fill in the danger months. They should, if necessary, go back to wooden aircraft for a time. To-day the bomber situation was, he said, serious.

Mr. Ede said that, as chairman of the joint electricity authority for an area which controlled a quarter of the output of electricity in this country, including the whole of that for London and the home counties, it was a matter of very grave concern to him that our great electricity stations should be so extremely vulnerable and, placed, as several were, by the Thames, such good landmarks. There was now a proposal to arrange a new generating station on a site near Gravesend, again on the line of the river.

Wing Cdr. Wright wished to contradict that deplorable but widespread belief that the main use of an Air Force in the next war would be the indiscriminate bombing of defenceless women and children. They should realise that an aeroplane, while it was very deadly, was an extraordinarily expensive and valuable weapon of war, and the pilot and trained crew were more expensive and more valuable. He did not believe that any commander would be so entirely unfitted for his job as to indulge in deliberate bombing of defenceless sections of the public. The first duty of an air force in the next war would be to destroy the air force of the opposing country. Having destroyed the enemy air force, the second duty was to attack the strategic points.

Wing Cdr. Wright then said that for a good many years Governments of all parties had had a policy which had been definitely in favour of disarmament; now it was unfair to the Air Ministry suddenly to turn round and change the policy and then expect makers to be able, by pressing a button, to produce the latest types of machines on which they should have been working years ago.

Mr. Montague said he could not help thinking that the statement that there were 15,000 aeroplanes in Germany available for service was an extravagant estimate. He also complained that, almost no matter what information they asked for in the House, they were met by the reply that it was against the public interest for the facts to be stated.

The Official Figures

Sir Thomas Inskip, Minister for the Co-ordination of Defence, said it was necessary to have in mind what had passed before they could see how far attainment had marched with plan. It was proposed that there should be an increase in the first line of the Metropolitan Air Force to a figure of approximately 1,750 aircraft, excluding the Fleet Air Arm, but including the Auxiliary Air Force, which was to be increased by four squadrons for co-operation with the Territorial Army. It was proposed to increase the number of squadrons overseas by 12, and to make a substantial increase within the next few years in the first-line aircraft of the Fleet Air Arm.

Sir Thomas pointed out that there was now a considerably different balance between the number of bombers and the plan which had been absorbed in the present scheme. One feature of the scheme was the creation of a great reserve of aircraft. He hoped they would appreciate that in all these computations of first-line aircraft there were behind them a large number of reserves, a policy which had always been part of the Air Ministry's plans since rearmament began. A second feature was the increase of striking power, not merely by replacing light bombers by medium bombers, but also by the decision to rearm the bomber squadrons with new machines of greater power, greater load-carrying capacity, and greater range.

Sir Thomas admitted that there had undoubtedly been delays, but he was going to speak to the House of the reasons for these delays. The present position was that 87 squadrons had now been formed; 13 of them were still on the one-flight basis. Others of the 87 squadrons were over-strength in personnel with a sufficient number of aircraft for training purposes. It was expected that 100 squadrons would have been formed by the end of March. Of these, 22 would be on a one-flight basis. He hesitated about giving dates and figures as to the other 24 squadrons to bring up the number to the full 124; he was, however, going to take a risk which might be brought home to him in six months' time by saying that if his expectations were fulfilled the remaining 24 squadrons, or at any rate 20 of them, would be completed by July next. The production line was really on a slowly rising scale, and the line of ascent would become steeper and steeper as the months went by.

As regards the three or four months' delay between promise and performance, he had not a word to say in reproach of the aircraft firms. They underrated the difficulties of large-scale production, but there was no blame to be attached to them in that matter. They might have followed the old method, produced a prototype or two, tested them and then begun production. The Government deliberately adopted the plan of ordering the new machines off the drawing board and testing them after they had been produced. They were satisfied they had made no mistake. In spite of the delays that had happened, they were still a long way ahead of the schedule that would have been possible by the old method.

To a remark by Mr. Winston Churchill that there had been considerable replacement in the last few months of machines designed seven years ago, Sir Thomas replied that if they had put every single manufacturer on the latest and most modern machines he doubted whether they would have had a sufficient supply for keeping the squadrons going. The second cause for delay was that they sent to the Middle East, to the Mediterranean and to the Aden command twelve squadrons with full complement to reinforce the squadrons already there. A third reason for delay was connected with the flying training schools. In the normal way the number of flying training schools would have been much smaller than it is. There were now eleven which employed a large number of personnel and aircraft.

Shadow Factories

The position of the shadow factories was that they would commence production as far as aeroplanes were concerned in the Austin factory in the autumn of the present year, and so far as engines were concerned production would begin in July of next year.

As regards protection of buildings against gas and high explosive attack, Sir Thomas said that a handbook on structural precautions would shortly be issued containing such proposals as had been found suitable, not for keeping out high-explosive bombs, but for defending the people against certain consequences. For a 500-lb. semi-armour-piercing bomb, 20 to 25 ft. of concrete and a certain amount of earth was necessary to keep it out. Obviously it was impossible to erect buildings for the protection of persons on that scale. The real answer was that they would have adequate defences available to prevent the aeroplane ever being in a position to drop its bomb.

The protection of the docks had already been included in the plans for the anti-aircraft defence arrangements applicable to the whole country. As to the fuel for the Air Force, naturally steps had been taken to provide an assured supply of aviation petrol as a primary necessity. Plans had been carefully worked out to ensure these stocks, and he was able to give the House a most ample assurance that not only were plans well devised, but the steps that had already been taken to lay up these stocks were very satisfactory. As for the vulnerability of the electricity undertakings along the River Thames, Sir Thomas said the interlocking of the electricity system under the grid would to a great extent reduce damage done.

Concerning the question of skilled labour, Sir Thomas said that he deprecated any excessive competition or labour-snatching between firms engaged on Government work.

Mr. Churchill on Bombs

Mr. Winston Churchill said that those who remembered the battlefields of the Great War and had seen craters made by 16 in. shells which weighed a ton, would certainly think that 20 to 25 ft. of concrete was a very satisfactory protection. Very few armour-piercing or semi-armour-piercing bombs would be carried. If the enemy aeroplanes were to carry them the number of bombs which they could drop would be enormously reduced.

They had been told that out of the 124 squadrons expected by March 31, there would only be 100. Of these, 22 would consist of only one flight each, and he thought that others would consist of only two flights each. Such squadrons could not really bear their part as complete squadrons, and therefore they should deduct the 22 from the 100, leaving 78. That, therefore, was the number they would have on March 31, instead of the 124 originally expected. In other words, they would be 46 squadrons short of the promised total.

Mr. Churchill thought 46 out of 124 was a considerable proportion, and pointed out that when the first programme was mentioned we already had 52 or 53 squadrons. In 20 months, therefore, they had added 25 or 26 squadrons, and to fulfil the programme they would need to do in nine weeks nearly double what they had done in 20 months. They had been

(*Concluded on page* 132.)

Topics of the Day

Comparative Experience . . .

WHEN people talk either of a pilot's experience or of the relative difficulty of the business of flying, as such, I often wonder whether they take the trouble to calculate the amount of experience which is quite normally gained in other means of transport.

As a private motorist I have probably averaged about 10,000 miles a year, either on two wheels or four, during the past twelve years. At an average cruising speed of 30 m.p.h. such a mileage provides me with a motoring experience of some 4,000 hours—or more than 300 hours a year. How many private pilots have flown 4,000 hours and how many of them average even 300 hours' flying a year? A commercial travelling motorist probably averages 600 hours a year—a figure which is only equalled by the most hard-worked transport pilot. A transport driver usually puts in more than 1,800 hours during a year.

Throughout every minute of my 300 hours a year on the road I have been doing something. Slowing up, accelerating, dodging other roadfarers, or attempting miracles of judgment on curves—in two dimensions. Only during a twentieth of his flying time is the pilot exercising real judgment in relation to the ground.

A few weeks ago I flew for a little less than four hours in one day and did four approaches, landings and take-offs, involving a period of about a quarter of an hour at the most. For the rest of my flying time I was either reading a map or estimating arrival times for my own amusement. The business of flying by itself required the exercise of neither energy nor judgment. During that four hours on the road I should have been involved in a dozen "phenomenal avoidances" and have arrived at my destination in a state of limpness almost equal to that experienced by a pilot who had spent four hours either doing landings or carrying out an aerobatic programme.

. . . And Skill

YET motorists, cyclists and pedestrians run into each other with depressing frequency. Admittedly they are working in a series of very narrow ribbons called roads, and we ourselves are far from blameless in the matter of fatal crashes, but I often think that if motorists could be trained as thoroughly as pilots the number of accidents would at least be halved.

Whereas the new motorist must perform a certain number of simple evolutions and answer a few questions, the pilot (even with the comparatively valueless "A") must have carried out two-score difficult approaches and landings, the second half of which number must necessarily have been virtually irreproachable. During his novitiate the pilot (for his own good) is sometimes treated like a naughty boy—a fact which breeds patience and humility—and an instructor's remarks are rarely varied to suit the financial or social standing of his pupil.

In the cockpit of a training aeroplane *Debrett's Peerage* and Marx's *Das Kapital* are laughed aside. The true aristocrat is the man or woman who really knows where the ground is after a matter of five hours' dual, or who finds his way from A to B with two-mile visibility on his first dual cross-country. Yet these flying führers have by then flown for a period which is equivalent to a motorist's 600 miles. Unfortunately for them, a serious mistake which results in a bent wing or two for the novice motorist sometimes means a completely written-off aircraft for the novice pilot—and possibly some personal damage as well.

The fact that there are so comparatively few broken aeroplanes or necks is proof both of the skill of the instructors and of the comparative safety of flying.

Another Step

NOWADAYS we are working steadily towards the aeroplane which will demand a little practice in watching air speed indicators and in moving levers rather than one which requires inborn skill and "feel." The days when people spoke of a good pilot as being possessed of good "hands" are nearly over as far as private owners are concerned. For the experts this may be very sad, but they will still be able to tell their children and friends about the days when flying *was* flying.

We who were brought up on Cirrus Moths will probably be the biggest bores in the club or the home some twenty years hence. The genuine war pilot is having his innings now, though his background has been tampered with by the plain and modest amateurs who have owned and liked S.E.5s and Bristol Fighters. He may still talk of Camels to an open-mouthed audience; they required "hands." But the unpleasant fact that one might be shot out of the sky by some well-meaning patriot does not make a particular pilot any more skilful than the cheerful amateur who finds his way from Brussels to Budapest in a second-hand Gipsy Moth. We just sit back and thank goodness that nobody is looking at us through a gun-sight—yet.

Which reminds me that this business of flying is still far too heroic. Until the hero business has been sat on the total number of private owners in this country will remain below the 700 mark. Though only a meek amateur, I occasionally find myself lounging about with an extremely embarrassing halo when, at a non-flying gathering, somebody introduces me as "Eustace Indicator—you know, he *flies!!*" The only reply, it would seem, is to introduce somebody else as "Percy Pinhead—you know, he motors!!" And he meets more danger per minute than I meet in an hour—with care.

INDICATOR.

FROM the CLUBS and SCHOOLS

YORKSHIRE

DURING the past fortnight members of the Yorkshire Aeroplane Club have put in 13 hr. 50 min. Flying was impossible on the majority of days owing to snow and sleet.

LONDON

Last week's flying time totalled 15 hr. 15 min. Messrs. R. Wilson and J. Westmacott made their first solo flights.

YAPTON

Flying times for January, to the 30th, were 42 hr. 5 min. Mr. D. Holland has passed the technical examinations for his "B" licence in meteorology and engines and rigging.

C. A. S. C.

Members flew 9 hr. 10 min. dual and 4 hr. 30 min. solo last Sunday. Mr. Parsons has been posted to No. 4 (Kent) Squadron. The annual dance will be held on February 18 at the First Avenue Hotel, Holborn.

KENT

Sixty hours were flown in January, gales and fog permitting only fourteen flying days. Messrs. Harvie and Klein are busy taking respectively "B" and instructor's licences, while Messrs. Gaylard, Truscott and Underwood have gone solo. New members include Miss Gordon and Messrs. Daniel, Nobbs, Sayers and Weaver. Mr. Rundle has passed his "A" licence tests.

CAMBRIDGE

Marshalls' Flying School put in 60 hr. 10 min. flying for the week ended January 31. Mr. Parsons has joined the School, while Messrs. Wade and Smedley have passed their "A" licence tests. A good deal of blind flying has been done by members who are taking their "B" licences, and several members have been taking map-reading instruction in the Puss Moth. Cross-country flights have been made to Reading and Northolt. No flying was possible on the 29th owing to the prevalence of fog and snow.

BROOKLANDS

The moderately good weather of Sunday enabled the Club and School machines to put in some twenty hours' flying, which, incidentally, equalled the total flown during the rest of a bad-weather week. Mr. F. J. Austin has gone solo, while Mr. Schmidt, having completed his course, has left for his native Holland. Miss Duncan has returned to renew her "A" licence and new members taking instruction are Messrs. Lydall, Ireland and Wood. The following students of the College of Aeronautical Engineering obtained passes in the December examinations of the Royal Aeronautical Society: Associate Fellowship—Messrs. Hetzel and Hush. Associate Membership—Messrs French and C. M. Jones, Gawade, Hogarth and Mass.

CINQUE PORTS

The recent gale of snow and the consequent low visibility caused two machines to be delayed, one at Croydon and the other at Hanworth. As soon as the weather improved, the Monospar took a load of pilots to collect the strays. Meanwhile, very little flying could be done and "B" licence pupils were concentrating on indoor work. It has been found necessary to add another Tiger Moth to the Club's fleet to cope with the increase in "B" licence training. This machine is to be collected from Croydon and painted in the Club's colours. The Club has secured contracts with the Air Ministry for both day and night co-operation with Royal Engineer units.

The annual general meeting took place on January 24. The chairman, Mr. W. E. Davis, gave an account of the general increase in the Club's activities during 1936, and spoke of the healthy state of the balance sheet. The 1936 committee were returned en bloc.

SOUTHEND

Owing to the snowy weather, flying was curtailed during last week. On Sunday Lord Sempill flew in on his way from Brussels. The Club is holding a dance on Saturday, February 13.

REDHILL

Flying time for the week ended January 29 amounted to 23 hr. 15 min. The total number of hours flown during 1936 were 3,274—an increase of 22 per cent. over those of the previous year.

LEEMING

Fog and bad weather conditions were responsible for the fact that only 7 h. 15 min. were flown during the week. Mrs. Rowntree is a new pupil, while Mr. "Bill" Humble has now joined the permanent staff of the York and Leeming Club. Mr. "Stainless Stephen" paid a visit to York aerodrome last Friday.

WITNEY AND OXFORD

Members of the Witney and Oxford Aero Club flew 690 hours during 1936. Recent members are Messrs. K. J. Wood, B. T. O'Reilly and R. L. Beaumont. One of the members, Major Eric Crossley, has purchased a Drone. A Club dance will be held at the Bear Hotel, Woodstock, Oxon, on February 26.

BRISTOL AND WESSEX

The new Club Cirrus Swallow (G-AESL) was recently fetched from Hanworth under gale conditions. The total flying time for the week ended January 23 amounted to 11 hr. 25 min. Miss Barbara Brown has passed her "A" licence tests, while Mr. John Keedwell is a new pilot member.

SOUTH COAST

In spite of the very wet weather Shoreham aerodrome has remained in good condition save for a small area at the north end. Members conveyed their congratulations to their president, His Grace the Duke of Norfolk, on his wedding, and presented him with a model of one of the Club Moths. New members are Mr. Munzing and Mr. Thoday, the former, particularly, doing as much flying as the weather will permit.

A.S.T.

The past year has proved a record one for Air Service Training. In addition to the 6,906 hours flown at the Ansty school, no less than 16,267 hours were flown at Hamble. At Ansty the entire efforts have, up to the present, been devoted to the training of R.A.F. *ab initios* and Reserve annual trainees. This training has, of course, continued at Hamble as well, but here there has been a great increase in civilian training, in which 6,239 hours have been flown, compared with 3,416 hours during the preceding year.

During the year forty-nine Imperial Airways' pilots passed the special marine training course, for which the school holds a three-years' contract, and another contract of interest is that for the training of the personnel of H.M.S. *Excellent* in height-finding and air-speed judgment, Hamble aircraft affording the practice required. During the year the following certificates were obtained: 31 "A" pilots' licences, 21 "B" pilots' licences, 6 2nd-class navigators' licences, 4 ground engineers' licences, 9 wireless licences and 5 R/T licences. No fewer than 164 civilians from twenty-three different countries underwent training during the year; two of them could speak no English when they arrived, and it is interesting to note that there has been a considerable influx of Egyptian students.

At the end of last year forty-eight students were taking the three-years' commercial pilots' course, as compared with thirty-nine in December, 1935. Twenty-eight were taking the two-years' ground engineering course The Hamble fleet continues to increase, the number of aircraft now being thirty-nine.

IN CRUISING TRIM: At 2,100 r.p.m. the Miles Whitney Strai'ght (a test report of which appears on pages 112-114) cruises at 130 m.p.h. The degree of vertical movement in the undercarriage can be gathered from the amount of the unpainted portion visible in the fairing on the port leg. (*Flight* photograph.)

Private Flying

PLEASING LINES: This, the latest product of the Koolhoven Company in Holland, is the F.K. 53 cabin two-seater. It is powered with a Walter Micron engine of 50 h.p.—a unit comparable with our own Weir engine, which should soon be in production.

NORFOLK AND NORWICH

In common with that at other clubs the weather during the past few days has not been at all encouraging for pupils and pilots. During the week-end the Club had a visit from Capt. W. S. Coates, who brought a Dragon from Heston for Air Commerce. Capt. Coates is an old member of the Club and obtained his "B" licence there in its early days. Mr. L. G. Dicks has made a successful first solo.

BORDER

Flying was confined to that of a "solo" character during a recent fortnight owing to the attendance of Flt. Lt. Potter at the Aerodrome Owners' Conference. Several machines visited the aerodrome, perhaps the most interesting being a Dragon (G-ACGG) which was at one time owned by the Duke of Windsor.

The Club flew 50 hr. 50 min. during January. This must be considered satisfactory when the unfavourable weather conditions are taken into account, and the fact that no instruction was available for one week. Flying was only possible on seventeen days during the month and then mostly by experienced pilots. Bad weather also interfered with the Dawn Patrol on January 31 and no "invaders" arrived during the zero time. Five Newcastle machines made three attempts to get through the hills and succeeded on their third. Unfortunately, after this stout effort, they were all "captured." New members are Messrs. Vaughan and Rhodes.

British Entries for Oasis Meeting

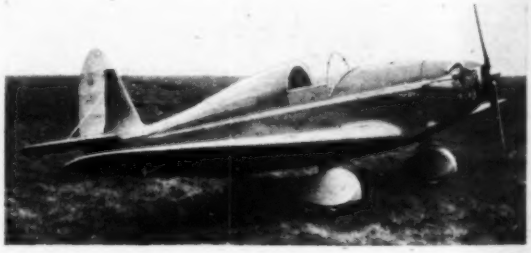
TWENTY-NINE entries from nine countries have so far been received by the Royal Aero Club of Egypt for the Cairo meeting, to be held from February 22nd to 26th. In addition, the Club informs us, twenty-six other entries are expected. The lists close at double fees on February 7.

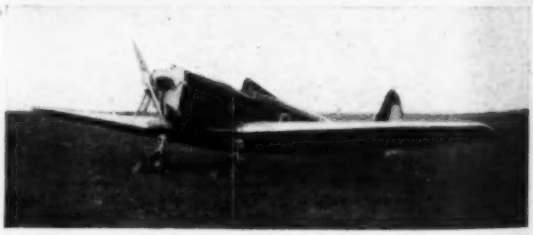
British entries, states the Royal Aero Club, are as follows:—F. C. J. Butler (D.H. Hornet Moth), E. D. Spratt (Miles Falcon), O. G. E. Roberts (Monospar S.T.12), Mabel and Sheila Glass (D.H. Moth), P. G. Aldrich-Blake and S. B. Cliff (Percival Vega Gull), C. G. M. Alington (Miles Hawk), C. E. Gardner (Beechcraft), R. K. Beale (Short Scion), Miss Lily Dillon (B. A. Swallow), Major J. C. Hargreaves (B. A. Eagle), F. Hills and Sons—pilot, J. Shoesmith—(Hillson Praga), Capt. J. K. Mathew (Miles Hawk Major), 2nd Lt. V. A. P. Budge (Miles Hawk Major), A. Ellison (D.H. Puss Moth), G. A. M. Vandeleur (Miles Hawk Major), James Haizlip (Beechcraft).

"Flight" Index

THE index to the July-December, 1936, volume of *Flight* is now available and is obtainable at 7d., including postage, from Flight Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1.

Binding cases are also available and are supplied, together with an index at 4s. 4d., postage included.





TWO LIGHTWEIGHTS: Although in very different categories from the pilot's point of view these two machines are examples of a modern trend. Above is the latest Belgian version of the Tipsy monoplane, complete with enclosed cabin which has, it appears, slightly raised the maximum speed. Below is the Dart Kitten, which is now flying; this machine was described in the issue of December 10.

Forthcoming Events

February 10. Yorkshire Aviation Services Annual Dinner and Ball, 8 p.m., Grand Hotel, Harrogate.
February 11. R.Ae.S. Lecture*: "The Automatic Pilot," by Mr. F. W. Meredith and Mr. P. A. Cooke.
February 12. De Havilland Technical School Annual Dance, 9 p.m., Hyde Park Hotel, London, W.1.
February 17. Royal United Services Institution Lecture: "Air Force Co-operation in Policing the Empire," by Air Comdr. C. F. A. Portal.
February 18. R.Ae.S. Lecture*: "Possible Layouts for Air-cooled Engines," by Mr. A. H. R. Fedden.
February 18. Civil Aviation Service Corps: Dance, First Avenue Hotel, London.
February 18. Norfolk and Norwich Aero Club: Tenth Anniversary Dinner.
February 18. R.Ae.S. (Coventry Branch) Lecture: "Silencing Aircraft," by A. H. Davis. Armstrong Siddeley Canteen, 8.15 p.m.
February 25. R.Ae.S. Lecture*: "Power Measurements in the Air," by Mr. N. S. Muir.
February 26. Brooklands and Associated Clubs: Dinner and Dance, May Fair Hotel, London.
February 26. Hampshire Aeroplane Club: Annual Dinner and Dance, South-Western Hotel, Southampton.
March 11. R.Ae.S. Lecture*: "Airscrew Blade Vibration," by Major B. C. Carter.
March 12. Leicestershire Aero Club: Annual Ball, Grand Hotel, Leicester.
March 12. Cinque Ports Flying Club: Annual Dinner and Dance, Grand Hotel, Folkestone.

* These lectures take place at the Royal Society of Arts, 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.

HERE and THERE

Service Art : The Brussels Show : Another Air War Film : Modern Aircraft on Postcards

COMPACT : This photograph shows, approximately actual size, the components of a new Timken taper roller bearing designed for engine rocker arms. Low weight, small overall size and the ability to absorb both radial and thrust loads are qualities to which the makers specially draw attention. In this country these bearings are being fitted by Armstrong Siddeley and Amherst-Villiers, and well-known foreign engines in which they are found include Wright, Hispano and Gnome-Rhône.

Royal Air Force Artists

THIS year the third annual exhibition of the Air Force Artists' Association, by its removal from the austere and scholastic atmosphere of South Kensington to 158, New Bond Street, seems more intimate, and we were glad to be welcomed once again by its honorary secretary, Capt. R. Graham, D.S.O., D.S.C., D.F.C.

Some of the exhibits are of very high professional standard, notably the portraits by Wilfred Higgins, the firm landscapes by Group Capt. A. C. Winter, O.B.E., and the delicate water colours by Lt. Col. H. Wyllie, O.B.E., whose father was the famous marine painter; fine in colour is Group Capt. H. J. F. Hunter's "Kurdistan," and refreshing is "London Window," by Muriel Borton. The exhibition was opened by the Rt. Hon. Sir Philip Sassoon on January 25, and remains open until next Saturday.

The Brussels Aero Show

THE date of the Brussels First International Aircraft exhibition has now been definitely fixed as May 26-June 6, 1937.

The organisers have appointed a British agent, from whom any required information is available. He is Mr. A. Thomson, 9, Albemarle Street, London, W.1. (Telephone: Regent 4147.)

Germinating

GERM Lubricants have bought from Airwork the Gipsy VI Falcon in which Tommy Rose won the King's Cup in 1935 and later broke the record to the Cape. Mr. J. C. V. K. Watson, the company's flying salesman, covers single-handed the British Isles, Europe, Scandinavia and North Africa, an area which would provide similar employment for about thirty people travelling on the ground.

His increased cruising speed, now in the neighbourhood of 160 m.p.h., should bring the parish boundaries within a comfortable day's flight.

Latécoère 582 Tested

THE Latécoère 582 reconnaissance seaplane has recently passed its official tests at St. Raphael. At a gross weight of 12 tons, the machine, piloted by Presty, took off three times in an average time of 6 seconds, and made three landings, all with full load in a seaway of more than three feet.

The Latécoère 582 has a maximum speed at 1,500 metres of 272 km./hr. At 2,180 metres the top speed is 279 km./hr., and at 4,000 metres it is 273 km./hr. The machine is equipped with four Gnome-Rhône engines of 740 h.p. each. The range is in the neighbourhood of 1,800 km.

Pilotless Frightfulness?

IS it asking too much of us to believe that at some time in the future a formation of bombers may be sent by wireless for long distances, carrying television equipment which will give the controller visual indication of their position and the conditions prevailing?

In a film, *Midnight Menace*, directed by Sinclair Hill, at present in course of production by Grosvenor Films, such a possibility is visualised. The services of Dr. Eric Rigby, who is in close touch with present developments in this sphere, have been obtained as technical adviser.

Scenes depicting the underground control room for five aeroplanes which are to bomb London have recently been

BASRAH BOGIES: Flame-proof-suited firemen with the new fire engine and crash tender constructed by Merryweather and Sons Ltd., of Greenwich, for Basrah Airport. The machine's equipment includes cylinders containing 4,000 cu. ft. of carbon dioxide, an "Xaust Suds" generator capable of producing foam at 400 gallons per minute, ordinary water fire-pumps, 20 ft. steel ladder, a stretcher, breathing apparatus, hand extinguishers, salvage tools, etc.

REPRESENTATIVE : All the newest military types are now represented in the series of *Flight* aircraft postcards. Recent additions include the Anson, Battle, Bristol 130 and Blenheim, Gladiator, Hampden, Harrow, Hind, Hurricane, London, Lysander, Spitfire, Stranraer, Venom, Wellington and Wellesley. Owing to increased output, it has been found possible to make a considerable price reduction; single cards now cost 4d. each, post free, while quantities of 12 or more are obtainable at 3s. a dozen.

shot. The operating conditions of each aircraft are shown on a control panel carrying an air-speed indicator, engine revolution indicator and an altimeter. On top in each case a large dial, resembling a Gyorizon, shows the machine's course. Bombs are released by a button and indicated by a red light. Above the panels are television screens receiving transmissions from their respective aircraft, while on a large map the progress of the formation as a whole is indicated by moving circles of light.

Remembering the progress already made with the Queen Bee radio-controlled target aircraft, it is the intention of the producers to give the public a film far removed from the extravagant futuristic thriller.

Financing Aircraft Purchase

HOW hire-purchase of new or second-hand aircraft may be facilitated, both for the buyer and the seller, is explained in an informative little booklet issued by the aircraft department of the Bowmaker Finance Corporation, who, it is stated, are pioneers of aircraft purchase by instalment and are one of the largest concerns of their kind in the country.

The booklet explains how each transaction is individually and speedily handled, and also deals with other aspects of the business, *e.g.*, the "stocking" plan for dealers wishing to hold aircraft for show or demonstration, and the financing of purchases of hangars, buildings, equipment, etc.

Those interested can obtain the booklet on application to the supervisor of the aircraft division, Flt. Lt. E. J. Ellis, R.A.F.O., 26, St James's Street, London, S.W.1.

(Left) One of the new Philips "threshold lights" to indicate aerodrome runways, referred to by Mr. A. T. Vulliamy in his article on lighting in *Flight* of January 21. The lamp is of the high-pressure sodium discharge type, which gives a very distinctive yellow light. The system is installed at Welschap Aerodrome, Eindhoven, Holland.

(Right) The cabin and front seat of the tandem-seater Porterfield monoplane, which cruises at 100 m.p.h. on a 70 h.p. Le Blond radial. Flying impressions appeared on page 41 of *Flight* for January 14.

GERMAN PRACTICE TO-DAY

Three Contrasting Designs Described

THREE contrasting designs recently produced in Germany are worthy of notice. Two emanate from the Henschel factory—not to be confused with Heinkel—which has been busy developing aircraft since it branched out from the Henschel locomotive works three years ago. It is said that the factory is one of the most efficient in the German industry.

The Henschel single-seater fighter and dive bomber. Between the undercarriage legs is an auxiliary fuel tank.

One Henschel type is a single-seater metal fighter and dive bomber, and may be described as a sesquiplane with single-bay, single-strut wings, with N struts for the centre section. The upper wing has two spars, while the lower is of the single-spar type. Lower surfaces of both wings are partly fabric covered, metal sheet being employed for the remainder. Ailerons are fitted to the top wing only, there being flaps on the lower wing.

An inverted vee-eight engine is fitted in the Henschel single-seater trainer.

The metal monocoque fuselage is of oval cross-section. The empennage has sheet metal covering for the tail plane and fins, while the rudder is fabric covered. There are trimming tabs on the elevators. The cantilever undercarriage legs are faired by coverings of rather unusual shape, probably necessitated by the Uerdin shock-absorber system.

The power plant is a 550-650 h.p. air-cooled B.M.W. 132 nine-cylinder radial, which is mounted on welded steel tube bearers and fitted with a helmeted N.A.C.A. cowling, which tends to give the whole machine a somewhat American air. It drives a three-bladed controllable pitch airscrew.

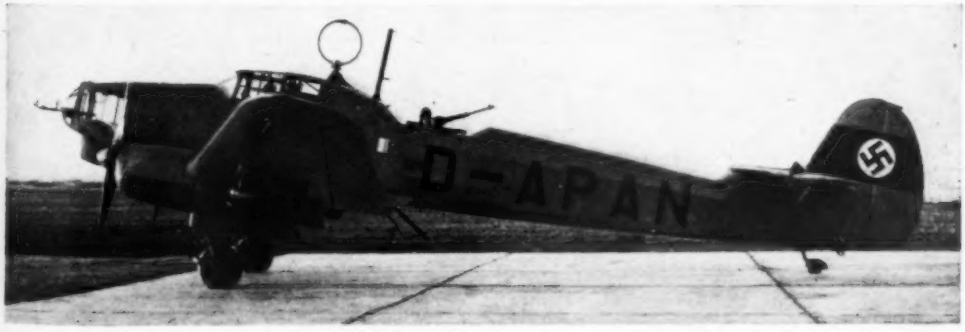
Leading data are as follows: Span (top wing), 10.5 m. (34 ft. 5 in.); (lower wing) 8 m. (26 ft. 3 in.); length, 8.6 m. (28 ft. 2 in.); height, 3.4 m. (11 ft. 2 in.); wing area, 24.85 m.² (267 sq. ft.); weight empty, 1,460 kg. (3,210 lb.); useful load, 760 kg. (1,670 lb.); gross weight, 2,220 kg. (4,880 lb.); wing loading, 89.2 kg./m.² (18.25 lb./sq. ft.); power loading, 3.4 kg./h.p. (7.5 lb./h.p.).

A Monoplane Trainer

The second machine is a wire-braced, low-wing, single-seater monoplane for training and aerobatic work. The general constructional methods are similar to those used in the fighter, the metal airframe being covered partly with sheet metal and partly with fabric, while the fuselage is of monocoque construction. Flaps are fitted to the wings, which are of elliptical plan form. The undercarriage consists of vee legs, faired in and braced one to the other by wires.

Power is provided by a 240 h.p. Argus As 10 C inverted vee eight engine, driving a two-bladed wooden airscrew.

Leading data and performance figures are as follows: Span, 10 m. (32 ft. 10in.); length, 7.3 m. (23 ft. 11 in.); height, 2.3 m. (7 ft. 7 in.); wing area, 14 m.² (151 sq. ft.); weight, empty, 695 kg. (1,550 lb.); useful load, 280 kg. (616 lb.); gross weight, 975 kg. (2,166 lb.); wing loading, 69.6 kg./m.² (14.2 lb./sq. ft.); power loading, 4.06 kg./h.p. (8.9 lb./h.p.); top speed, 280 km./hr. (174 m.p.h.); landing speed,



The Focke-Wulf F.W.58 has a wide sphere of usefulness as a military trainer, its scope including gunnery, bombing, blind-flying and general twin-engine tuition.

90 km./hr. (56 m.p.h.); climb to 2,000 m. (6,560 ft.), 4 min.; ceiling, 7,000 m. (23,000 ft.); duration, 2 hours.

A Bomber-trainer

A new version of the F. W. Weihe has just been produced by the Focke-Wulf Company of Bremen. The original machine, it may be recalled, was intended for training pilots in twin-engined flying, and for wireless blind flying and night flying training, bombing and machine gunnery training. The F.W.58 differs from the earlier types, mainly in having an enclosed cockpit for the front gunner. In conjunction with the better shape of the windscreen over the pilot's cockpit, the change has resulted in a considerable increase in performance.

In order to enable the front gunner to work his gun while the machine is flying at high speed or carrying out rapid manœuvres, a cupola of Plexi-glass forms the front part of the fuselage. The gunner occupies a prone position while working the gun.

The excrescence under the nose of the fuselage contains the bomb sight, and for training purposes there is room in the nose of the fuselage for an instructor as well as for the pupil.

When the machine is being used for blind flying training and for training wireless operators, the transparent cupola in the nose of the fuselage is replaced by a sheet aluminium nose piece.

The 240 h.p. Argus vee-eight again figures in this specification, two being employed.

The Lowe-Wylde Fund

LATEST donations to the Lowe-Wylde Fund bring the total up to £970 15s. 6d. as at January 19, so the trustees are now within sight of the total aimed at—£1,100—when the fund was inaugurated in the summer of 1935.

Nevertheless, contributions are coming in rather slowly, and it is to be hoped that all generously minded members of the aviation community will assist the organisers in their effort to reach the goal as speedily as possible.

The fund is to provide for the three orphan children of Mr. C. H. Lowe-Wylde, who was killed in 1933 while testing an ultra-light machine of a type which he pioneered.

Latest contributions are:—

	£	s.	d.
David Longden, Esq.	5	5	0
Arthur C. R. Waite, Esq.	5	0	0
F. C. Pritchard, Esq.	4	4	0
Griffith Brewer, Esq.	2	12	6
G. W. Hubbard, Esq.	2	2	0
J. W. Seddon, Esq.	2	0	0
C. L. Terry, Esq.	1	1	0
A. H. Hall, Esq.	1	1	0
H. E. Symons, Esq.		10	6
R. E. Tongue, Esq.		10	6

Contributions should be sent to Mr. E. C. Gordon England at the London Air Park, Feltham, Middlesex, cheques being made payable to "The Lowe-Wylde Memorial Fund."

WITH BLINKERS: In view of the antique appearance of the Territorial searchlights as commonly seen in and about London, there is interest in this photograph, taken near Vienna and said to represent Austria's very latest mobile searchlight unit.

Zeppelin Plans

AT the beginning of May it is probable that the airship *Hindenburg* will resume the Frankfort-Lakehurst service, which will be made every ten days until the autumn. The South American service will be started in the middle of March with the *Graf Zeppelin*.

Williamson Cameras Record

THAT the firm's year had been a record one was announced by Mr C. M. Williamson, C.B.E. (managing director), at the annual dinner and dance of the Williamson Manufacturing Co. Ltd., makers of "Eagle" aircraft cameras. Sir Philip Dawson, M.P., M.I.C.E., M.I.M.E., M.I.E.E., in the chair, congratulated the employees on their co-operation in effecting such a large increase in the output.

Airwork's Active Year

AIRWORK, LTD., of Heston, reviewing the past year's work, record that in their service department no fewer than 4,132 job cards were issued. These included 107 C. of A. overhauls and fifty complete engine overhauls. Outstanding jobs completed included the equipment of Smiths' Aircraft Instruments' Dragon "flying showroom" with an automatic pilot and many instruments, and the rebuilding for Imperial Airways of wings for H.P.42 and Atalanta types. An important order now in hand involving a quantity of drawing-office work, is the equipment of a Dragon purchased by the Irish Free State from the Airwork Sales Dept. This includes radio, bomb rack, camera, trapdoors and troop accommodation, provision for parachutes, navigation, landing and signalling lights, and a drogue target and winch.

The technical services department has also been busy, its work including a visit by Mr. L. A. Lafone, Technical Superintendent to the Anglo-Iranian Oil Company's flying organisation, which has its headquarters at Abadan and is staffed by Airwork personnel. Export work has included the shipment of aeroplanes to Europe, Egypt, India, North and South America and Australia. The De Havilland 86b SU-ABV is due to start almost immediately on its delivery flight to Misr-Airwork in Egypt. It is being flown by Captain R. W. M. Hall, with Mahomet Hazek Effendi as second pilot and Mahomet Fawzi Effendi as ground engineer. Mr. T. H. Fox is travelling out as wireless operator, and there will be two passengers.

The Company's Bristol Service Department likewise reports a busy year, which included maintenance of the whole fleet of the Bristol and Wessex Club, the fleet of Western Air Transport for the greater part of the year, and six privately owned aircraft.

The year's Airwork operations at Manchester, it is stated, have shown a very encouraging upward trend. From January 1 to December 31, over 4,500 landings and take-offs were recorded, showing an increase of 20 per cent. over the previous year, while over 5,000 passengers were handled, an increase of 10 per cent. The majority of passengers were carried during the summer by Railway Air Services and West Coast Air Services (the latter company operated to Manchester in the summer only).

A fog line was laid down during the year, and has been used by regular services in very low visibilities.

Two aircraft construction firms commenced operations at the Airport of Manchester. Hillson Pragas have been undergoing constructional and C. of A. test flights after assembly at the airport, and the makers propose to open a flying school very shortly. The Fairey Company has also used the airport in connection with the assembly and test flying of the Hendon.

PLASTICS in AIRCRAFT CONSTRUCTION

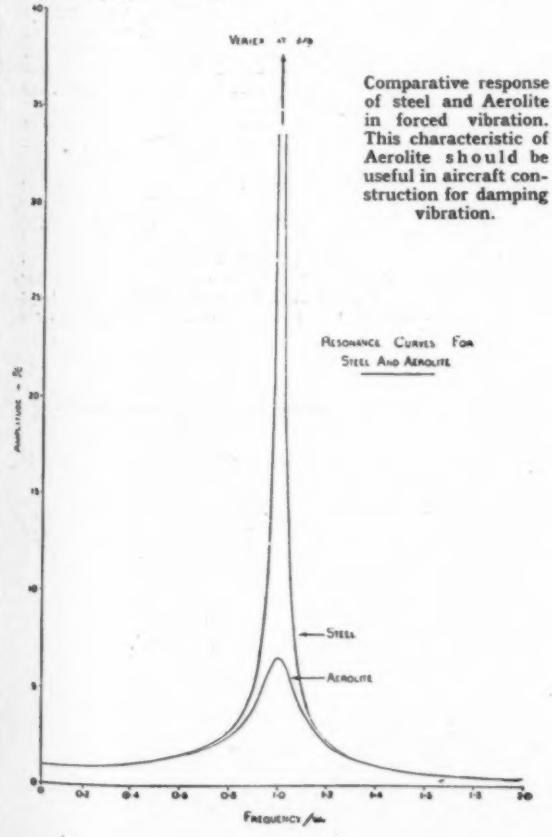
Present Position in the Use of a Promising New Material : Dr. N. A. de Bruyne's R.Ae.S. Lecture

PART I.

THAT synthetic resins are a good deal nearer to being suitable materials for aircraft construction than had been generally supposed was revealed in the extremely fascinating lecture given by Dr. Norman A. de Bruyne, Fellow of Trinity College, Cambridge and director of Aero Research, Ltd., Duxford, to the Royal Aeronautical Society last Thursday. Shortcomings of plain resins can evidently be met to a very great extent by reinforcing the material, and the stiffness and imperviousness to damp, petrol, acids and so forth, as well as its fireproof qualities, make it attractive from many points of view.

Dr. de Bruyne had written a remarkably informative paper on the subject under the title "Plastic Materials for Aircraft Construction." This, together with the 77 references to other works, can be studied by anyone who wishes to possess all the information available. To save time (the printed paper was very long), Dr. de Bruyne gave a short talk, illustrated by slides, for the benefit of those who had not previously made a study of plastic materials and their properties. The following notes attempt to combine both without claiming to follow either closely.

The lecturer pointed out that an account of a subject in an early stage of development must contain many first thoughts and guesses, and the author must be prepared to take the risk of having to eat his words at a later date. However, he thought it was better to have blundered than never to have thought at all [a point of view which is all too rare among research people.—ED.].



Comparative response of steel and Aerolite in forced vibration. This characteristic of Aerolite should be useful in aircraft construction for damping vibration.

The study of the mechanical behaviour of synthetic resins was largely the study of matter in an amorphous state. In contrast to that of single crystals, our knowledge of polycrystalline matter was meagre. Practically all we had we owed to Professor L. Prandtl of Göttingen (a name more familiar in connection with concepts such as the boundary layer and induced drag). The property of resins which attracted the aircraft designer was the possibility of moulding them into intricate shapes. Most resins are "thermoplastic," i.e., they become soft when the temperature exceeds a certain value. Some kinds of synthetic resins have the valuable characteristic of being "thermosetting," i.e., when once moulded they set to permanently infusible products. Thus all resins could be divided into these two classes.

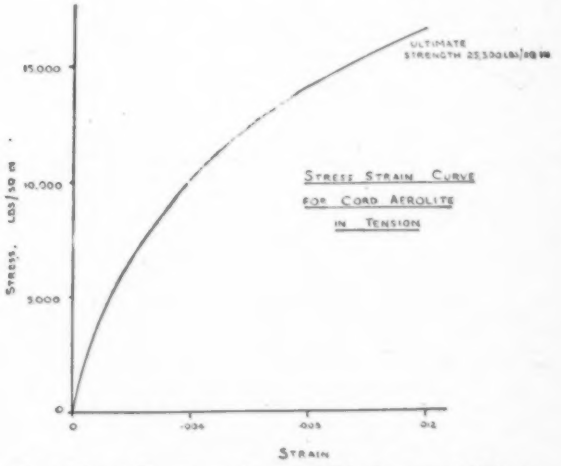
Thermoplastic resins were not of great interest for structural purposes, as they necessitated uncomfortably high moulding temperatures, but two of them, cellulose acetate and methyl methacrylate, were widely used for windscreens and fairings. Thermosetting synthetic resins are essentially condensation products formed by linkages between molecules with the elimination of water, while thermoplastic synthetic resins are polymerisation products formed by the simple process of joining up similar molecules as pearls strung on a thread.

Thermosetting Resins

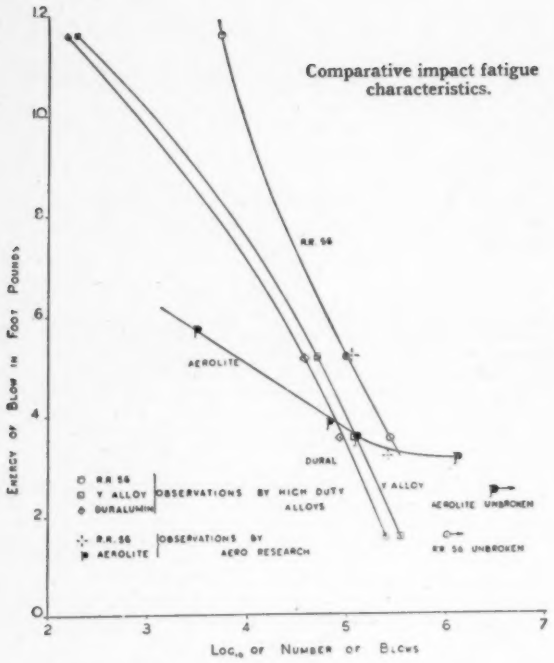
The two main groups of thermosetting resins are the phenol formaldehyde group and the urea formaldehyde group. All synthetic resins are weak in tension, and urea formaldehyde resins have an affinity for cellulose which results in a brittle structure and prevents the use of cellulose, which is otherwise the best reinforcement on a strength-to-weight basis. The urea formaldehydes, by the addition of suitable retarders and catalysts, can be made into excellent cements, which, unlike casein cements, are proof against attacks of mould and fungus.

Dr. de Bruyne explained that for convenience he would refer to phenol formaldehyde resins by the name of Bakelite, although this was a trade name; it had, however, the merit of doing honour to Dr. Baekeland. He did not think it was too much to hope that control of the molecules in thermosetting resins, at present somewhat uncertain, might one day be attained, thus giving us a product, without reinforcement, having the strength of cotton or silk.

When synthetic resins were tested in compression they showed a similarity in hysteresis to that of stone, cement and



Up to 6,000 lb. per sq. in. hysteresis is present, but no "elastic after effect"; above this stress the strain rises gradually on applying the load and does not reach a final steady value until a few minutes after the application of the load.



cast iron; this could be similarly described as "elastic hysteresis" in contrast to the "plastic hysteresis" of ductile materials. Failure under compression was of a sudden explosive kind, and the specimen split up into a number of columns or needles whose major axes were parallel to the direction of the applied load. Tests on cresol resin cylinders 1 in. long by ½ in. diameter gave an ultimate strength of 24,350 lb./sq. in. Cresol resin was weak in tension and broke at about 5,000 lb./sq. in. The nature of failure was characteristic of a brittle material.

The type of failure could be profoundly modified by the addition to pure Bakelite of powdered fillers or of continuous reinforcement, and the shear failure then became the usual type. Wood flour was commonly used as a filler for phenol formaldehyde. The type of fracture changed at about 10 per cent. of wood flour, failure then taking place by shearing along a plane at approximately 45 deg. to the direction of compressive failure, after a good deal of plastic deformation.

Greater strength in tension could be obtained by the use of a continuous reinforcement, when the tensile strength could be made comparable with the compressive strength. Cotton was one of the most suitable of the common materials, the use of a textile material being an advantage because of the endurance to repeated bendings.

Dr. de Bruyne proposes to call Bakelite with continuous reinforcement "Aerolite." During the discussion Dr. F. W. Lanchester recalled an old book, *Astra Castra*, which seemed to convey that aerolite meant much the same as meteorite. Apart from that, pistons are made—by the Light Production Co., Ltd.—as a proprietary article under that name, so it would appear that Dr. de Bruyne would be well advised to invent some other name for the reinforced Bakelite with which he is experimenting. However, for the sake of brevity we will adopt the name for the remainder of these notes.

Early work on micarta airscrews, by Caldwell and Clay in America, had shown that by having a material in which 90 per cent. of the reinforcement was in the warp, a product extremely strong in tension along the warp was obtained. This class of material Dr. de Bruyne calls Cord Aerolite, and said that it represents the simplest possible type of reinforcement. It has very little effect on the ultimate compressive strength, which remains about the same as for the pure resin, but it alters profoundly the stress-strain characteristic above 6,000 lb./sq. in., when the strain increases rapidly for a given stress, and something similar to plastic deformation takes place. The cords could be regarded as a series of columns stabilised in compression by the surrounding resin, and the resin ceased to have a stabilising influence at about 6,000 lb./sq. in. In tension, however, the cord reinforcement has a remarkable effect on the properties of Aerolite, increasing the tensile strength to about 26,000 lb./sq. in, and Young's Modulus to at least 2.0×10^6 lb./sq. in.

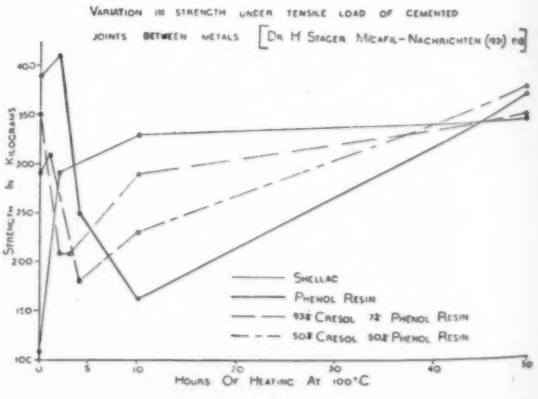
Stress-strain curves showed that, as in compressive behaviour, it appeared as if the resin and cord reinforcement were able to act together so long as the lateral stress was less than the moulding pressure. Above this stress, the cord reinforcement shrank away from the surrounding resin which then fell out of action. Dr. de Bruyne gave an interesting demonstration of the effect of tension in the cords on the mechanical model which visitors to his laboratories saw at Duxford last summer.

Continuing, Dr. de Bruyne explained that the energy absorption properties of Aerolite were very high, about twice the value of those of wood, and recalled that anyone who had flown a metal Moth after flying a wooden Moth must have noticed the increase in the amount of engine vibration which reached the cockpit. The use of Aerolite should further reduce vibration. The beneficial effects of high energy absorption could also be illustrated by considering an airscrew blade which was free at one end and was given a sudden twist at the other. The effect of the sudden twist would be to send a torsional wave down the blade; this wave would be reflected at the tip, and would return to the fixed end with practically undiminished energy if the material had small energy absorption. If, however, the material had finite energy absorption, the reflected wave would return with diminished energy, and the maximum stress would be correspondingly reduced.

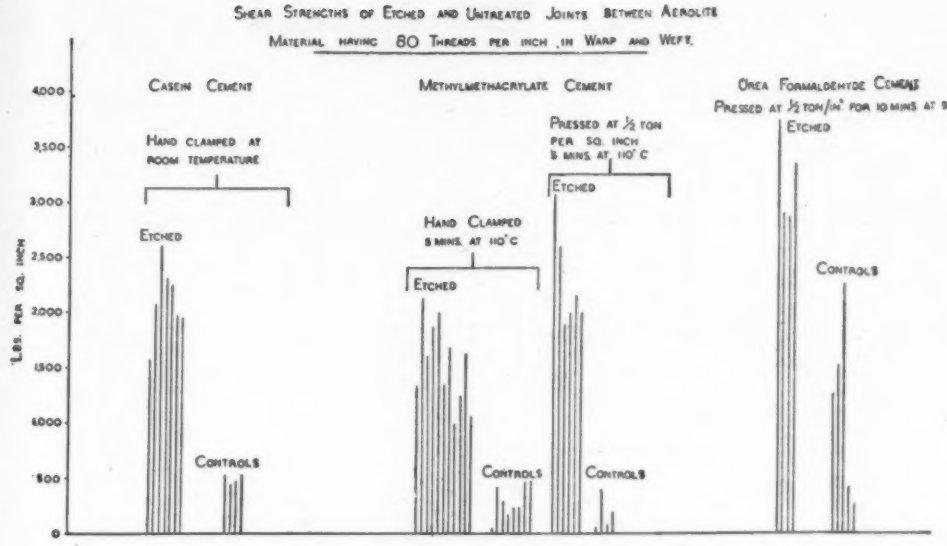
Energy Absorption

In general it would be expected that energy absorption would raise the critical speed at which wing flutter took place, because the energy thus used up had to be supplied by aerodynamic forces. It was, however, only when the ratio of torsional to bending stiffness was low that energy absorption had any marked effect. In monoplanes the ratio was high, and energy absorption had no considerable effect. Although an Aerolite wing would have a low bending stiffness, it could be made to have, weight for weight, a greater torsional stiffness than a metal or wooden wing. The energy absorption powers of Aerolite would not, therefore, have any marked effect on the critical speed, but since the critical speed was primarily dependent on the ratio of torsional to flexural stiffness, such an Aerolite wing should have a higher critical speed than a wing of wood or metal of equal weight. The lecturer also mentioned that the static fatigue characteristics of Aerolite are similar to those of wood.

The problem of glueing or cementing Aerolite is one of fundamental importance because the development of a successful method would simplify the construction and repair of aircraft structures. Riveted and bolted joints can, Dr. de Bruyne maintains, be made, and much more easily than in wood, but a practical method of glueing would be so much simpler. The smooth, glass-like surface of Aerolite prevents any kind of interlocking, and the amorphous structure of the material provides few anchorages for primary bonds. Dr. de Bruyne records in his paper a number of investigations carried out at Duxford, of which etching the Aerolite in such a way as to


VARIATION IN STRENGTH UNDER TENSILE LOAD OF CEMENTED JOINTS BETWEEN METALS [DR H STAGER MICAFIL-NACHRICHTEN (93) P8]
STRENGTH IN KILOGRAMS
HOURS OF HEATING AT 100°C
SHELLAC
PHENOL RESIN
93% CRESOL 7% PHENOL RESIN
50% CRESOL 50% PHENOL RESIN

The effect of time of curing on the tensile strength of cemented joints.



How the etching of Aerolite affects the strength of glued joints.

break up the phenol formaldehyde structure but leaving the cotton reinforcement untouched appeared to be the most promising. "We have not yet," Dr. de Bruyne said, "had time to carry out any extensive investigations, but the results, such as they are, lead us to believe that the problem of making cemented joints and of building up structures *in situ* can be regarded as solved in principle." They had also obtained good results by sandblasting, and had constructed a simple device by which the fabric could easily be exposed along the directions in which the glued joint was to be made.

It was comforting to learn from the paper that when bolted joints are used with Aerolite the bearing strength is over five times greater than that of spruce along the grain, and about 40 times greater than spruce across the grain. This meant that bolts could be spaced much closer than in wood.

Applications of Aerolite

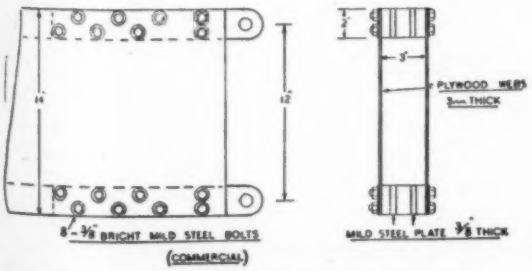
After having dealt with the properties of Aerolite, Dr. de Bruyne, in his printed paper, gives some suggested applications in aircraft structures. Following are extracts from this part of the paper:—

Monoplane Wing Root Joints.—The most troublesome joints in an aircraft structure are the attachments of the outer wings to the centre section. In a cantilever machine the bending moments at the wing roots are extremely high and necessitate the use of heavy fittings with numerous bolts. As an example we may consider an aeroplane of one ton gross weight. The factored bending moment at the front spar joint after allowing for all relief loads, might be 285,000 lb./in. with a shear load of 3,400 lb. Airworthiness requirements stipulate that at a load of 62.5 per cent. of the fuel load there shall be no permanent set. The distance between the top and bottom attachments might be 12 in., resulting in a factored load in the top and bottom flanges of 23,750 lb. (10½ tons). Assuming the spar to be 3 in. wide we should require, say, eight ⅜ in. bolts in each flange; thus in the centre section front spar there will be 32 bolts. Taking in account the rear spar and the outer wings we shall need 128 bolts. These bolts could be lightened with $\frac{7}{16}$ in. holes, but even so the weight of the front and rear spar centre section bolts alone amounts to 7.76 lb.

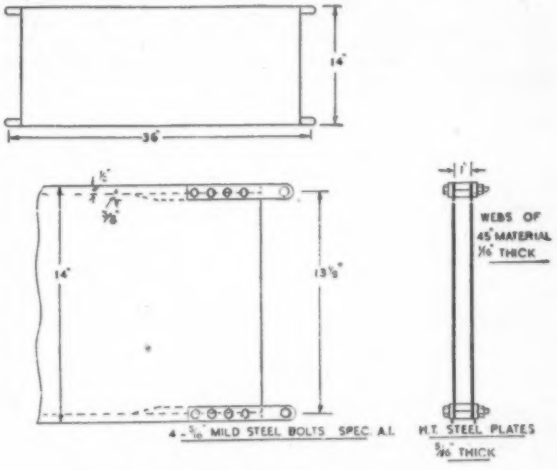
A saving in weight can be obtained by using Aerolite for the spar ends, not only through the reduction made possible in the number of bolts and the size of the fittings, but also through the reduction in the sizes of packing blocks. These Aerolite ends could be glued with a spliced joint to the wood; but for the centre section, which might be only 3 ft. wide, it would hardly be worth while making such glued joints and it would be better to use Aerolite entirely for the centre section spar. The spar width could then be reduced to 1 in., thus reducing the length of each bolt to one-third. Due to the more uniform bearing pressure along the length of the bolts the fittings could simply be held on to each side of the spar instead of in saw cuts as in the wooden centre section. The reduction in flange area also makes possible an increase in the distance between top and bottom attachments with a consequent reduction in the forces produced by the applied bending moment.

Sketches of the different methods of construction are shown.

(To be Concluded.)



Joint in wooden front spar of centre-section.



Joint in Aerolite front spar of centre-section.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

THE MONOSPAR CROYDON'S FLIGHT

I WAS most interested to read Mr. Crocombe's article on the "wanderings" of the Monospar Croydon printed in your issue of December 10, which only reached us out here a few days ago. The portion of the article which was of particular interest was that "explaining away" the unfortunate flight from Port Darwin on the homeward journey. The article conveys the impression that the pilot's navigation was beyond reproach, and one is left to assume that the Port Darwin W/T station had an off-day. I would like to suggest that the boot was one the other foot. The position before the flight was:

(a) A compass, about which there was considerable doubt, was the chief navigational instrument.

(b) The W/T station at Koepang was to be closed during at least half the flight.

(c) The Port Darwin W/T station had proved very reliable so far.

With reference to (a), apparently no effort was made to swing the compass before taking-off from Port Darwin or even to obtain a check on the deviation on the course Darwin-Koepang. Nor, apparently, was the deviation obtained in flight by means of a bearing of the sun at sunrise.

With reference to (b) and (c), the pilot obviously gambled on the accuracy of tail bearings from Port Darwin W/T station in a part of the world where D/F does play peculiar tricks, and on bearings for which accurate calibration of this particular D/F station is difficult if not impossible. Had it been a question of homing on to Port Darwin, it might have been excusable, but, flying away from the station, any error is obviously magnified as the flight proceeds. Why could the pilot not have waited till Koepang was open? Why not admit that he took a chance because he was in a hurry?

Having started the flight a little over an hour before dawn, the pilot should have trusted his compass and paid no attention to a mere 1 deg. off course, as shown by Darwin's first bearing. A bearing of the sun at sunrise would have given him an accurate figure for the compass deviation and a drift reading; in addition would have given his track. The answer may be that a bearing compass was not available on the machine; if that is the case, I ask why one was not carried on a flight from England to Australia and back when compass deviation is known to vary enormously owing to changes of latitude?

Obviously, the Port Darwin W/T station *was* getting first-class bearings and was justified in giving them to the pilot, but neither he nor the pilot can tell what the wireless waves have been doing *en route*.

G. F. SIMOND,
Singapore Flight Lieutenant.

[In order to avoid an unduly prolonged discussion, we have submitted a copy of Flt. Lt. Simond's letter to Mr. F. F. Crocombe, whose comments follow.—ED.]

I HAVE read with interest the criticism of an old acquaintance of mine, Flt. Lt. Simond, concerning the final phase of the flight of the Monospar Croydon. Afterwards, having got away with our lives against considerable odds, Wood, the pilot, remarked to me that he was sure to be criticised by numerous arm-chair critics who, with the facts of both sides of the argument before them, would not hesitate to tell him what ought to have been done. In my article I paid a tribute to Wood's navigation as judged by his excellent work all the way out to Australia, and on the return up to the termination. Reviewing all the facts, as I know them, there is no reason why that opinion should be altered.

Remember that on the previous day Wood, the sole pilot and navigator, had traversed the difficult North Australian stretch, where landmarks are almost non-existent, by compass only and without mistake. Then he had finally checked the compass with care against geographical features when close in to Darwin. Immediately upon our landing the Darwin W/T operator was asked whether his bearings in the early morning, before dawn, were likely to be affected. So confident was his reply that, instead of starting at dawn, when an independent check could have been made by reference to Bathurst Island, we took off one and a quarter hours before sunrise.

After that I admit that Wood, in striving for meticulous accuracy, should not have indulged in attempting to correct his course for so small an apparent error of 1 deg. The mere fact, however, that our course was changed three times should have caused Darwin W/T to follow us round and give us progressively different bearings, although quantitatively they might be in error. If such had been the case our suspicions would have been aroused. Even so, we challenged the accuracy of the third bearing, an item which, it has now been established, was not recorded in the Darwin W/T log. Assuming that there was a considerable "night error," I have it from no less an authority than the Marconi Company that this should have been obvious to the Darwin operator in that, instead of a clear-cut bearing indication, our call signals would be silent over a considerable arc of rotation of the D/F loop. Under such conditions the bearings should have been labelled second-class.

Subsequent analysis of our course showed a compass error (deviation) of 15 deg. Why this large departure after our check of the previous evening we do not know; we wish we did. But in any case the Darwin W/T station should have been able to give us some clue as to our departure from the true course, instead of a string of first-class bearings persuading us that all was well.

We did not carry a bearing plate for sun observation and our view of the sun was delayed by a widespread partial cloud belt just below our altitude of 7,000 ft. Wood might have eventually made a very rough check here, but he had just received another "first-class" W/T bearing. The Koepang W/T station has no D/F equipment and was therefore of no use to us.

I must point out to Flt. Lt. Simond that it is compass *variation*, due to the earth's magnetic field, and not deviation which varies widely with latitude. We were well aware of the changes and also of the fact that the varying magnetic content of the aircraft structure might affect the *deviation*, for which reason we checked up wherever possible.

We all greatly appreciated the prompt action of the R.A.F. at Singapore, as well as that of the Dutch from Sourabaya, in instituting a search, even though the hope of finding us must have been remote.

Hanworth. F. F. CROCOMBE.

HILLCREST ROAD SPEAKS

IT'S a pity that "A. Viator" in his comments on "The Week at Croydon" in *Flight* of January 21, should scoff at the residents in the neighbourhood of the Airport and write in a flippant strain of the "good villagers," as he chooses to call them.

It is natural that he should be prejudiced in favour of aviation and aviators, but I, being what he terms one of the "good villagers" and residing in very close proximity to the scene of the disaster, am under the impression that the "monster petition" has been drawn up to try to obtain protection for our homes and our families and emphasise the necessity for ensuring that every precaution is taken by aircraft taking-off or landing during bad weather. It is quite untrue to say that it is "an example of prejudice against commercial aviation."

I think he might try to enter into the feelings of those residing in houses so close to the scene of the accident, remembering that it was the women and children left at home who witnessed the harrowing scenes and, in the case of one home, an elderly invalid was lying helpless in bed a few doors away from the badly damaged house.

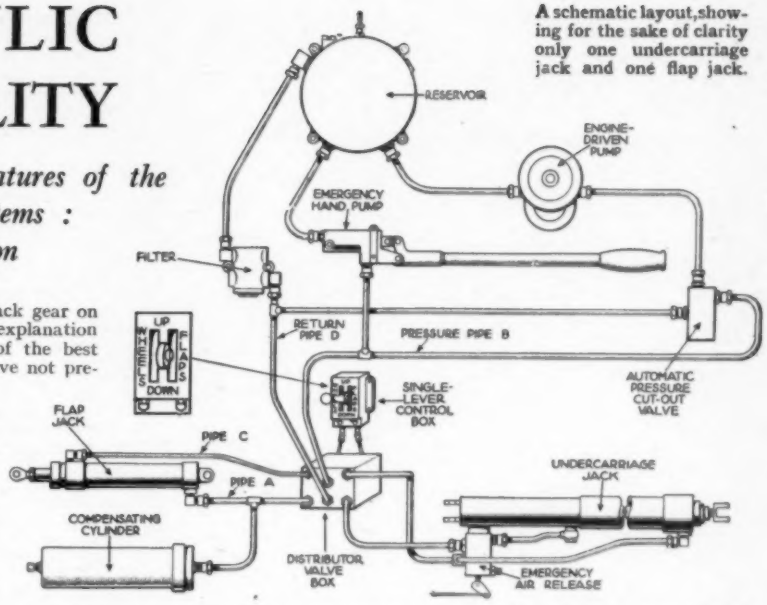
No doubt "A. Viator" would have more sympathy and regard the matter in a different light if he were a resident of the neighbourhood, but perhaps he takes the precaution of living miles away from an aerodrome and can afford to scoff at the "good villagers" in their efforts to protect their families and avoid a repetition of what might have been an even more terrible disaster had the house on which the aircraft fell been occupied, as it would have been in a matter of three days after the date of the accident.

Croydon. A GOOD VILLAGER.

[The writer of the above letter does not enclose his name, or any address other than "Hillcrest Road, Purley"—the thoroughfare in which the K.L.M. Douglas crashed. However, since it seems genuinely to present the other side of the subject, we have in this instance made an exception to our usual rule of not publishing letters sent anonymously.]

HYDRAULIC VERSATILITY

Ingenious and Simple Features of the Latest Dowty Systems : Wide Application



A schematic layout, showing for the sake of clarity only one undercarriage jack and one flap jack.

SO extensive is the use of hydraulic jack gear on modern aircraft that the following explanation of the operating principle of one of the best known should interest those who have not previously given the subject much study.

At Arle Court, Cheltenham, Mr. G. H. Dowty has built up a very important business—Aircraft Components, Ltd.—devoted entirely to this specialised work and to the design and manufacture of internally sprung wheels and tail wheels.

The actuation of retracting undercarriages and tail wheels, flaps, gun-turrets, gun-firing gear, bomb doors, trimming tabs, cowling gills, etc., by means of hydraulic jacks has become increasingly popular during the past two years, this method now being adopted by practically every British constructor. Probably the chief reason for this rapidly increasing popularity is the fact that a central power unit, namely, the pump (which may be operated by the aircraft engine or by hand, or may be a self-contained electrically operated unit) can be used to perform all the functions mentioned above.

Moreover, the hydraulic system offers a very simple means of gearing up or gearing down between the power unit and the final operating device, for it is only necessary to vary the piston areas of the units in order to give the desired gear effect.

Safety Devices

The system devised by Aircraft Components, Ltd., is extremely simple, and the diagram on this page explains the principle. Only one undercarriage jack and one flap jack are shown in the diagram, but tappings may be taken off to operate any other units required.

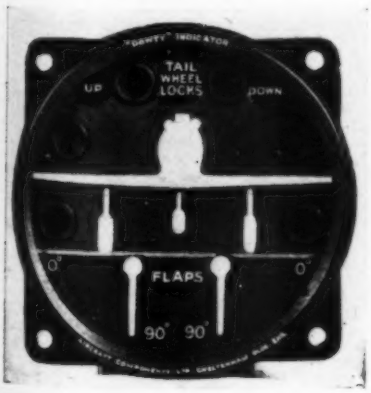
One of the features of the Dowty system is the method adopted for emergency lowering of the undercarriage in the event of failure of the hydraulic system due to damage by gunfire or other cause. Compressed air, stored in a small container (in many installations one of the undercarriage members is utilised) is released into the undercarriage jack by means of a small valve which may be actuated by cable, Bowden wire or any other light type of remote control. Immediately this control is actuated the compressed air also releases the locks which are used to hold the undercarriage in the retracted position. This emergency lowering system adds practically no extra weight.

Turning to the diagram, during the whole time that the engine is running the pump A delivers oil continuously to the automatic pressure cut-out valve, which normally allows the oil to flow direct back to the reservoir *via* the filter. Under these conditions the pump is just idling, as no pressure is generated in the pipe lines through which the oil is flowing.

The pilot is provided with a single-lever control for operating the undercarriage and tail wheel, flaps and gun-firing gear. To avoid bringing the hydraulic pipe lines into the cockpit this lever is connected to the distributor valve box by means of any form of remote control—such as push-rods. The operation is as follows: For example, to lower the flaps, the control lever is moved out of neutral to the gate position labelled "flaps down." This actuates the distributor valve so that the pipe A is connected to the pressure pipe B and the pipe C is connected to the return pipe D. The automatic pressure cut-out valve instantly goes into action and the pump supplies oil under pressure to operate the flap jack.

When the jack piston reaches the end of its stroke the automatic valve cuts off the supply and the pump then continues to circulate oil, under no pressure, to the reservoir.

To raise the flaps the lever is moved to the opposite end of the gate labelled "flaps up," and by this means the pipe C is connected to the pressure pipe B and the pipe A is connected to the return pipe; the cut-out valve again throws the pump into the circuit and oil is delivered under pressure until the jack has reached the end of its stroke. The flap jacks may be stopped at any point throughout the length of their travels by placing the control lever in the neutral position, thus enabling the pilot to set the flaps at any desired angle.



The ingenious dashboard tell-tale.

Overload Allowance

It will be noticed from the diagram that the pipe A is connected to a small compensating cylinder which contains an initial charge of compressed air. This is introduced to prevent undue strain on the wing in the event of, say, the machine being dived with the flaps down; the resultant load in the flap jacks causes oil to rise in the cylinder, further compressing the air, and when the flap load is reduced this air pressure returns the flaps to the fully down position.

In the majority of installations the undercarriage is maintained in the fully extended and also in the fully retracted position by means of latch locks, which are mechanically operated by the retracting jacks, and these locks automatically engage with the undercarriage whether the control lever is returned to the neutral position or not. It will be seen from the diagram that all jacks are positively operated in both directions by oil pressure.

The hand pump is provided as a stand-by in case of failure of the engine-driven pump.

To prevent undue pressures occurring in any of the pipe lines owing to variations in temperature, the distributor unit is provided with automatic relief valves which compensate for variations in volume.

Available for use in conjunction with the undercarriage and flap operation system is the ingenious electro-mechanical indicator illustrated on this page. It tells the pilot at a glance the position of the undercarriage and tail wheel and the angle of the flaps, and coloured lights indicate when the components are locked fully home.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — *AIR MINISTRY ANNOUNCEMENTS*

H.R.H. THE DUKE OF GLOUCESTER

The Air Ministry announces that His Majesty The King has been graciously pleased to appoint His Royal Highness Henry William Frederick Albert, Duke of Gloucester, K.G., K.T., K.P., G.C.M.G., G.C.V.O., to be an Air Vice-Marshal in the Royal Air Force and to be Personal Aide-de-Camp to His Majesty.

ROYAL AIR FORCE—AWARDS

The King has been graciously pleased to approve of the following awards to the undermentioned officers and airmen of the Royal Air Force:—

Awarded the Air Force Cross

Sqn. Ldr. Francis Ronald Downs Swain.
Flt. Lt. Victor George Aidan Hatcher.
Flt. Lt. John René Whitley.
Flt. Lt. Harry Broadhurst.
Flt. Lt. Henry Paterson Fraser.
F/O. (Hon. Flt. Lt.) Cyril Frank Uwins (Reserve of Air Force Officers).

Awarded the Air Force Medal

Sgt Leonard Cecil Lambert.

ROYAL AUSTRALIAN AIR FORCE

The King has been graciously pleased to approve of the following award to the undermentioned officer of the Royal Australian Air Force:—

Awarded the Air Force Cross

Flt. Lt. Robert Henry Simms, R.A.A.F.

ANOTHER NEW SQUADRON

No. 52 (Bomber) Squadron formed at Abingdon on January 18. The unit is being equipped with medium bomber type of aircraft and has been placed in the Bomber Command in No. 1 (Bomber) Group. It will move to Upwood by March 4, on which date it will be transferred to No. 2 (Bomber) Group.

R.A.F. STATION, ODIHAM

The name of the R.A.F. Station, Odiham, will be "R.A.F. Station, Odiham (No. 50 Army Co-operation Wing)."

NEW STATION HEADQUARTERS

A station headquarters will form at Church Fenton, near Leeds, on April 1, on which date the station will be placed under the command of the A.O.C.-in-C., Fighter Command, in No. 11 (Fighter) Group, until May 5, 1937, when it will be transferred to No. 12 (Fighter) Group.

A station headquarters will form at Debden, near Saffron Walden, Essex, on April 1, on which date the station will be placed under the command of the A.O.C.-in-C., Fighter Command, in No. 11 (Fighter) Group, until May 5, when it will be transferred to No. 12 (Fighter) Group.

A station headquarters will form at Linton-upon-Ouse, Yorkshire, on April 1, on which date the station will be placed under the command of the A.O.C.-in-C., Bomber Command, in No. 3 (Bomber) Group.

A station headquarters will form at Marham, King's Lynn, Norfolk, on April 1, on which date the station will be placed under the command of the A.O.C.-in-C., Bomber Command, in No. 3 (Bomber) Group.

The above-mentioned aerodromes may be used with effect from March 4, for aircraft of personnel visiting the station on duty, but no facilities of any kind will be available until the aerodromes are taken into general use.

CHANGES IN HIGHER COMMANDS

The Air Ministry announces the following appointments:—

Air Vice-Marshal Lawrence Arthur Pattinson, D.S.O., M.C., D.F.C., to be Air Officer Commanding, No. 23 (Training) Group, in February, 1937, vice Air Commodore Charles Dempster Breese, C.B., A.F.C.

Air Commodore Alfred Guy Roland Garrod, O.B.E., M.C., D.F.C., to be Air Officer Commanding, Armament Group, in February, 1937, vice Air Vice-Marshal Lawrence Arthur Pattinson, D.S.O., M.C., D.F.C.

MOVES OF SQUADRONS

No. 63 (Bomber) Squadron will move from Andover to Upwood on March 4.

No. 214 (Bomber) Squadron will move from Scampton to Feltwell on April 16.

AUXILIARY AIR FORCE SQUADRONS

No. 602 (City of Glasgow) (Bomber) Squadron and No. 605 (County of Warwick) (Bomber) Squadron, together with the R.A.F. Station at Castle Bromwich, will be transferred, within the Bomber Command, to No. 2 (Bomber) Group, with effect from February 14.

FLYING ACCIDENTS

The Air Ministry regrets to announce that A.P/O. Joseph Norman Bell lost his life in an accident which occurred at Barnard Castle, County Durham, on January 23 to an aircraft of No. 9 Flying Training School, Thornaby. A.P/O. Bell was the pilot and sole occupant of the aircraft.

The Air Ministry regrets to announce that A.P/O. Norman Harwood Brace lost his life in an accident which occurred at Llanfyllin, Montgomeryshire, on January 27, to an aircraft of No. 5 Flying Training School, Sealand. A.P/O. Brace was the pilot and sole occupant of the aircraft.

VACANCIES FOR APPRENTICE CLERKS

The Air Ministry announces that further vacancies will shortly occur for well-educated boys to enter the Royal Air Force as apprentice clerks. This is a career which may appeal to many boys who, while they may have no leaning towards a mechanical trade, are attracted to service life and wish to travel abroad. Entries will be made in April and July of this year and applications should be forwarded to the Air Ministry not later than April 1 and July 1 respectively. Candidates must be in possession of an approved school certificate and be between the ages of 15½ and 17½ on the first day of the month of entry. Full information (A.M. Pamphlet 9) may be obtained from the Inspector of Recruiting, Royal Air Force, Victory House, Kingsway, London, W.C.2.

Successful candidates undergo a thorough course of training in clerical duties during their first eighteen months' service. Special attention is given to their general education and to physical training. Whilst undergoing training apprentices receive pay of 7s. weekly during the first year, and 10s. 6d. weekly until they both qualify and have reached the age of 18. Their food, outfit, and accommodation are provided by the Service. Subsequently pay varies from 21s. to 31s. 6d. a week, according to the degree of success attained at the passing-out examination. Opportunities occur later for advancement in rank with increased rates of pay.

Apprentice clerks are attested for twelve years' regular Air Force service from the age of 18. At the age of 30 they return to civil life, but will normally be given an opportunity of entering the Royal Air Force Reserve and of drawing a gratuity of £100. A limited number may be permitted to re-engage to complete twenty-four years' service, thus qualifying for pension.

ROYAL AIR FORCE GAZETTE

London Gazette, January 26, 1937
General Duties Branch

Air Vice-Marshal R. E. C. Peirse, C.B., D.S.O., A.F.C., is appointed Director of Operations and Intelligence and Deputy Chief of the Air Staff, Air Ministry, vice Air Vice-Marshal C. L. Courtney, C.B., C.B.E., D.S.O. (January 25); Flt. Lt. G. E. Strangman is granted a permanent commission in that rank (August 16, 1936).

The following Flight Cadets having successfully passed through the Royal Air Force College, Cranwell, are granted permanent commissions as Pilot Officers with effect from and with seniority of December 19, 1936: C. D. Milne, H. E. Bufton, B. Barthold, S. W. B. Menaul, H. F. Burton, I. S. Soden, L. F. Cooper, L. D. Wilson, N. C. Harding, I. J. Fawdry, I. T. B. T. Rowland, P. E. S. F. M. Bowne, T. D. Calnan, R. H. McConnell, G. S. H. Powell, R. S. J.

Edwards, D. W. Burt, K. Ault, L. W. Lowden, A. R. Vaughan Williams, G. P. Robinson, J. G. Fraser, D. A. ffrench-Mullen, D. E. Bennett, M. H. Cox, M. C. Pearson, W. A. Harris, R. M. B. D. Duke-Woolley, S. P. Coulson, A. D. Jackson.

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—D. L. Amlot, W. I. McConnell, F. M. Milligan, D. E. C. Trench (November 6, 1936). E. A. Liversidge, G. O. Mills (November 18, 1936); D. R. Chance, J. W. C. Powell, R. G. Taylor (November 25, 1936); D. T. Collins, G. Drew, L. M. Gaunce, D. Genders, M. E. Reid, A. W. Ridler, J. F. Roulston, T. Rowland, J. W. C. Simpson, A. H. Smythe, J. L. Sullivan, J. H. Wedgwood (January 6).

F/O. L. G. Levis is promoted to the rank of Flight Lieutenant (January 15); F/O. R. P. H. Carew takes rank and precedence as if his appointment as Flying Officer bore date November 17, 1936. Reduction takes effect from November 17, 1936; Lt. A. C. R. Duvall, R.N., Flt. Lt., R.A.F., ceases to be attached to the R.A.F. with effect from December 21, 1936, on return to Naval Duty, and is re-attached to the R.A.F. as a Flight Lieutenant with effect from January 18, and with seniority of April 1, 1935; Wing Cdr. G. H. Bowman, D.S.O., M.C., D.F.C., is placed on the retired list at his own request (January 20); Flt. Lt. W. L. Bateman is transferred to the Reserve. Class A (January 16); Flt. Lt. the Hon. G. R. Ward is transferred to the Reserve, Class A (January 21).

Equipment Branch

F/O. F. C. Read is promoted to the rank of Flight Lieutenant (January 10).

Medical Branch

The following are granted short service commissions as Flying Officers with effect from January 4, and with seniority of the dates stated:—W. T. Buckle, M.B., Ch.B., D. F. Cameron, M.B., Ch.B., E. S. Sidney, M.B., Ch.B., J. C. Taylor, M.B., Ch.B. (January 4, 1936); J. D. Milne, L.R.C.P., and S. (July 28, 1936); S. Paul, M.R.C.S., L.R.C.P. (August 24, 1936); H. O'B. Howat, M.B., Ch.B., J. H. Lewis, L.M.S.S.A. (January 4).

Memorandum

A. B. F. G. Richardson is granted an honorary commission as Sec. Lieutenant (January 20, 1919).

Erratum

In the *Gazette* of January 8. For Charles Kendall Grattan Bushe, read Charles Kendal Grattan Bushe.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

The following are granted commissions as Pilot Officers in Class AA (January 26):—C. W. Furse, P. L. Shinnie.

D. Dewar is granted a commission as Flying Officer in Class BB (January 12); Major T. F. G. Strubell is granted a commission as Flight Lieutenant (Honorary Squadron Leader) in Class C (November 16, 1936); Capt. R. Stiven (Indian Army retired) is granted a commission as Flight Lieutenant in Class C (November 24, 1936); P/O. R. K. Curzon is promoted to the rank of Flying Officer (September 23, 1936); F/O. R. H. Lemon is transferred from Class C to Class A (December 7, 1936); F/O. H. O'B. Howat relinquishes his commission on appointment to a commission in the Medical Branch of the Royal Air Force (January 4); Flt. Lt. A. H. C. A. Rawson relinquishes his commission on completion of service and is permitted to retain his rank (March 8, 1936); F/O. G. P. Olley, M.M., relinquishes his commission on completion of service and is permitted to retain his rank (December 4, 1936).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—D. L. Clackson (January 10); A. G. Miller (January 18).

No. 611 (WEST LANCASHIRE) (BOMBER) SQUADRON.—K. M. Stoddart is granted a commission as Pilot Officer (December 18, 1936).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore.—S. W. Smith, O.B.E., to Headquarters No. 1 (Bomber) Group, Abingdon; on appointment as Air Officer Commanding vice Air Comdre. O. T. Boyd, O.B.E., M.C., A.F.C., 7.1.37.

Group Captain.—R. G. Parry, D.S.O., to R.A.F. Station, Dishforth; to command, 7.1.37.

Wing Commanders.—L. O. Brown, D.S.C., A.F.C., to R.A.F. Station, Odiham; to command, 11.1.37. B. J. Silly, M.C., D.F.C., to Directorate of Organisation, Air Ministry, vice Wing Cdr. T. F. W. Thompson, D.F.C., 7.1.37.

Squadron Leaders.—S. H. Ware, to R.A.F. Depot, Uxbridge; for Administrative duties at School of Physical Training, vice Wing Cdr. H. G. W. Lock, D.F.C., A.F.C., 9.1.37. C. R. Smythe, to Headquarters, No. 17 (Training) Group, Lee-on-the-Solent; for Air Staff (Maintenance Liaison) duties, 11.1.37. A. Leach, M.C., to Air Armament School, Eastchurch; for Administrative duties, vice Wing Cdr. T. V. Lister, 11.1.37.

Flight Lieutenants.—E. J. George, to No. 3 Flying Training School, Grantham, 11.1.37. C. C. McMullen, to R.A.F. Station, Kenley, 11.1.37. A. H. Harrison, D.S.M., to Superintendent of the Reserve, Hendon, 11.1.37. H. P. Burwood, to R.A.F. Station, Gosport, 12.1.37. D. Y. Feeny, to No. 48 (G.R.) Squadron, Manston, 13.1.37. J. R. Scarlett, to Headquarters, No. 17 (T.) Group, Lee-on-the-Solent, 29.12.36. N. W. F. Mason, to Station Flight, Duxford, 15.1.37. M. C. Collins, to Marine Aircraft Experimental Establishment, Felixstowe, 13.1.37. W. P. Sutcliffe, to No. 811 (F.T.B.) Squadron, 12.1.37. K. F. Ferguson, to Station Flight, Duxford, 13.1.37. W. H. Forbes-Mitchell, to No. 4 Armament Training Camp, West Freugh, 4.1.37. D. G. Keddie, to School of Photography, South Farnborough, 4.1.37.

Flying Officers.—P. B. B. Ogilvie, C. G. R. Lewis, to School of Photography, South Farnborough, 4.1.37. T. R. Manson, to School of Air Navigation, Manston, 11.1.37. J. G. Macintyre, to No. 1 School of Technical Training (Apprentices), Halton, 3.1.37.

Pilot Officers.—J. H. G. McArthur, to No. 2 Armament Training Camp, Aldergrove, 14.1.37. W. C. A. Church, to Electrical and Wireless School, Cranwell, 6.1.37. P. A. M. Stickney, C. F. King, E. W. Martin, to "E" Flight, Manston, 7.1.37.

Acting Pilot Officers.—A. H. Smythe, to Headquarters, No. 1 (Bomber) Group, Abingdon, 13.1.37. I. B. N. Russell, L. K. Keith, to No. 25 (Fighter) Squadron, Hawkinge, 10.1.37. T. S. R. King, C. R. B. Wigfall, to No. 35 (Bomber) Squadron, Worthy Down, 10.1.37. R. A. B. Learoyd, to No. 49 (Bomber) Squadron, Worthy Down, 10.1.37. P. A. Burnell-Phillips, L. H. Schwind, to No. 54 (Fighter) Squadron, Hornchurch, 10.1.37. J. Ellis, B. J. E. Lane, to No. 66 (Fighter) Squadron, Duxford, 10.1.37. J. H. Giles, to No. 83 (Bomber) Squadron, Turnhouse, 10.1.37. A. C. Leggate, to No. 98 (Bomber) Squadron, Hucknall, 10.1.37. J. Martin, M. L. Morris, to No. 101 (Bomber) Squadron, Bicester, 10.1.37. J. R. D. Hird, to No. 104 (Bomber) Squadron, Hucknall, 10.1.37. S. N. L. Maude, to No. 114 (Bomber) Squadron, Wyton, 10.1.37. J. W. H. Bray, S. A. Ellaby, to No. 139 (Bomber) Squadron, Wyton, 10.1.37. B. R. O'B. Hoare, R. B. Smith, to No. 207 (Bomber) Squadron, Worthy Down, 10.1.37. D. E. Hughes, F. F. Lambert, to No. 220 (G.R.) Squadron, Bircham Newton, 10.1.37. W. M. H. Brookes, L. G. Burnand, R. C. Porteous, J. B. Wray, to School of Army Co-operation, Old Sarum, 10.1.37. P. H. Alington, J. St. J. Thomson, to School of Air Navigation, Manston, 10.1.37. F. R. Jamieson, to R.A.F. Station, Gosport, 10.1.37. F. L. Chadwick, D. L. England, B. P. Jones, to No. 7 (Bomber) Squadron, Finningley, 10.1.37. P. E. Torkington-Leech, to No. 9 (Bomber) Squadron, Scampton, 10.1.37. J. W. S. Fowler, J. F. Grey, L. V. James, to No. 12 (Bomber) Squadron, Andover, 10.1.37. J. A. W. Lawrence, P. F. Webster, to No. 15 (Bomber) Squadron, Abingdon, 10.1.37. M. P. Richards, to No. 17 (F) Squadron, Whyteleafe, 10.1.37. W. C. S. A. G. Cooper, R. A. L. Knight, to No. 23 (Fighter) Squadron, Northolt, 10.1.37. J. S. Adams, to No. 29 (Fighter) Squadron, North Weald, 10.1.37. J. P. Hopkins, W. G. Oldbury, M. L. Wells, to No. 38 (Bomber) Squadron, Mildenhall, 10.1.37. A. R. Pruddah, F. W. S. Turner, to No. 99 (Bomber) Squadron, Mildenhall, 10.1.37. L. M. Blome-Jones, F. D. D. Jones, to No. 103 (Bomber) Squadron, Andover, 10.1.37. A. T. B. Campling, F. A. Ives, to No. 151 (F) Squadron, North Weald, 10.1.37. N. B. Mole, to No. 220 (G.R.) Squadron, Bircham Newton, 10.1.37. A. S. B. Blomfield, P. J. Emerton, J. M. Holden, D. R. Hopper, D. P. Hughes, P. N. Jennings, to School of Army Co-operation, Old Sarum, 10.1.37. F. O. Thresher, to School of Air Navigation, Manston, 10.1.37.

The undermentioned are posted to No. 3 Flying Training School, Grantham, with effect from 11.1.37:—T. W. La B. Bamford, P. L. Billing, T. A. Cox, H. G. D. Devey, T. E. Gray, E. A. Good, W. H. Martin, N. Orton, J. P. C. Rolt, P. C. Rolt, A. T. Thompson, J. F. Ross, C. K. G. Bushe, J. R. Cree, J. Jefferies, H. R. Hamilton, R. H. R. Hett, C. R. C. Howlett, J. C. Hunter, G. D. O. Le M. Hutchesson, R. V. Jeff, N. G. Birks, R. J. Miles, D. A. Smith, P. S. Touchbourne, and R. Thompson.

Accountant Branch

Squadron Leader.—J. F. R. Eales-White, to No. 6 Flying Training School, Netheravon, 7.1.37.

Commissioned Signals Officers

Flying Officers.—R. K. Nicholas, to Headquarters, Training Command, Market Drayton, 11.1.37. W. M. E. Cannock, to R.A.F. Station, Leconfield; on appointment to a permanent commission, on probation, with effect from 8.1.37.

Medical Branch

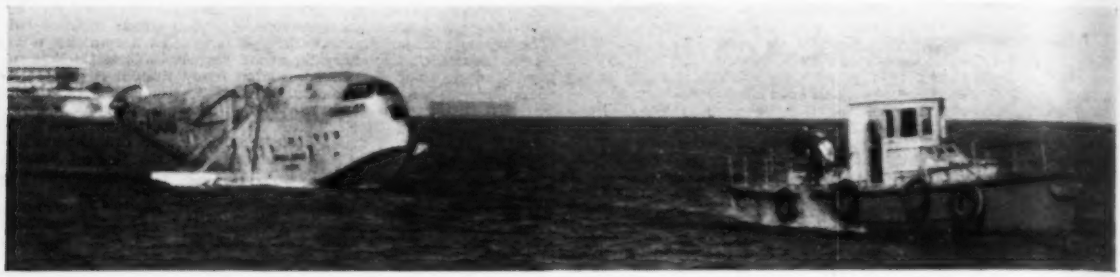
Squadron Leaders.—A. Harvey, to Directorate of Medical Services, Air Ministry; for Staff duties, 15.1.37. B. W. Cross, to Aircraft Depot, Hinaidi, Iraq; for duty as Senior Medical Officer, Iraq Levies, and Officer Commanding Levy Hospital, Hinaidi, 9.12.36.

Flight Lieutenant.—J. F. Ziegler, to R.A.F. Station, Calshot, 16.1.37.

Flying Officers.—The undermentioned are posted to the Medical Training Depot, Halton, on appointment to short service commissions with effect from 4.1.37:—W. T. Buckle, D. F. Cameron, H. O'B. Howat, J. H. Lewis, J. D. Milne, S. Paul, E. S. Sidney, and J. C. Taylor.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



IN BERMUDA : This somewhat unusual picture shows how *Cavalier*'s hull was towed from the naval dockyard to the Darrell's Island base, where the machine is being assembled. The floats on either side are, of course, quite temporary affairs.

THE WEEK AT CROYDON

This Pioneering : A New Horror : Weights and Measures : Floods : Every Qualification : Co-operation

IT appears that last week I treated one of these "epoch making" flights with scant ceremony. I gave no more space to the departure from Croydon of a pea-green, newspaper-owned aeroplane having a Motoring Correspondent aboard as a passenger, than I should have given to one of those sardonically conceived and cynically executed transatlantic record attempts. How was I to know that a London-Liverpool flight, along one of the oldest air routes—over which Railway Air Services run a monotonously regular daily service—was a "pioneer flight" worthy of front page photographs, as well as a large map of perilous and uncharted country? The fault, too, is doubtless mine for not realising that Speke airport is a sort of outpost of Empire "which we shall make our base for future exploration."

Outpost of Empire

I have a mental picture of a grim, lonely figure seated on a pemmican keg, writing, by guttering candle-light, dispatches headed "Advance Base"; this in a log hut playfully labelled "Adelphi Hotel." Mind you, they have exciting times, these pioneers. Ordinary hum-drum air line pilots think QBI bad enough, but way up in the Frozen North the Creme de Menthe Express has actually encountered the horrors of something entirely new in the way of bad weather—to wit "QBJ., or impossible weather." Down here, in the temperate zones, QBJ. just means, "What is the height of the top of the clouds?" so you see how difficult this exploration business really is.

A curious error in weighing an aeroplane before the issue of its C. of A. created all sorts of ridiculous rumours here last week. The machine was a Brian Allen import, a Stinson Reliant S.R.C., and the weighing error amounted to 407lb., which apparently gave the machine a maximum permissible pay load of a pilot and 90lb. or so. All sorts of not very bright young people clustered round bars, telling each other about it, not realising that no firm in its senses would put a machine like the Reliant on the market unless it had a proper pay load. The actual disposable load is, of course, around 1,200lb.; otherwise there wouldn't be hundreds of these machines in use in the States, and quite a few over here.

Quite a number of aerodromes appear to have been affected by recent floods, but Croydon, with all its faults, is free from criticism in this matter. Owing to the quick-draining chalk soil, the surface is nearly always admirable whatever the weather. A *Notice to Airmen* advises pilots, for the present, to find out in advance about conditions at their destination aerodrome, in case nothing appears above the surface except a wind stocking and the control officer's head and neck. Local patriotism, however, is strong and cases may occur of officials replying, "Our surface is magnificent," without adding a rider to the effect that there is a couple of yards of water on top of it. It is strenuously denied, by the way, that a *Notice to Passengers* will shortly be issued to advise those not fitted with gills to avoid subways and to bring their water wings with them.

Olley Air Service, Ltd., had an interesting air ambulance case last Tuesday, when Capt. Morton flew to Switzerland with a lady patient for whom oxygen apparatus was necessary. More and more use is being made of the air ambulance, and I wonder that no company in this country has its own doctor and trained nurses for such jobs. Abroad, the K.L.M. can always supply an ambulance machine complete with the company's own doctor. Incidentally, I am informed that the Dutch Red Cross, in conjunction with K.L.M., has produced a special stretcher for air work, and that there is even an ingenious attachment of mirrors so the patient can see the scenery.

Bermuda-Bound

Mr. N. Richardson, at present in England, is going, I hear, to Bermuda to act as first officer on the Imperial New York-Bermuda service. If one is to believe idle gossip, it appears that Mr. Richardson possesses a Master Mariner's ticket as well as those of a First and Second Mate, "B" and "A" licences, W/T and R/T operators' licences, First and Second Navigators' licences, a First Signals, a Second Gunnery, a First Torpedo, a First Anti-Gas, and several ground engineers' tickets, as well as such useful licences as St. John Ambulance, Dog, Gun, Driving and Marriage. Whether he is licensed to sell tobacco and malt and spirituous liquors in his spare time, I do not know.

The K.L.M. Douglas D.C.3 is at present being used regularly on the London route. Interesting comparative

figures with the Fokker F12s used two years ago on the Amsterdam—Batavia route, show how rapidly air transport develops. The D.C.3, on a recent run to the East, used 5 per cent. less fuel, took 27 per cent. less time at a 35 per cent. higher speed and carrying a 73 per cent. greater pay load.

The Army Co-operation flying season is about to start, though civil pilots get enough R.A.F. co-operation at times when fast aircraft pop out of clouds, unheralded by any previous radio warning. The other day a pilot reported a spot of what appears to have been Navy co-operation right on one of the main air routes. Bursts of gunfire were seen around what must have been Queen Bee aeroplanes, which clever little insects seemed to be holding their own pretty successfully. A large commercial aeroplane, flying innocently upon its lawful occasions in an area not meant for nautical wildfowling, must be a pretty tempting target.

A curious rumour reaches me to the effect that, at one of the other London airports, the locals think that Croydon pilots boycott the place even when the weather at Croydon is bad. The fact is, of course, that, in weather which is pretty poor everywhere, people don't like landing at a strange aerodrome.

A. VIATOR.

Radio in the Hebrides

A SHORT-RANGE radio station is now in operation at Sollas aerodrome, North Uist, working on a frequency of 348 kc/s (862 m.). Northern and Scottish Airways' pilots have long merited this essential assistance.

Meanwhile, as if to balance this new service, the Sumburgh (Shetlands) D/F station is temporarily out of action.

Swissair Increases

SINCE the Swissair traffic figures have shown, for 1936, an increase in the number of passengers and the amount of freight and mail carried, it is not surprising that this company has ordered two new 21-seater D.C.3s for the coming season. The figures, incidentally, show an all-round increase of 22.5 per cent. in terms of ton-miles.

Safety Tests for the Potez 62

THE official figures of certain tests carried out last year by the French Air Ministry at Villacoublay with the 14-seater Potez 62 have just been published. They are worth giving since this twin-engined machine has been very popular on the Paris-Marseilles service, and Air France have, in fact, acquired a fleet of eighteen of them. Fitted with Gnome Rhone K 14s, with an all-up weight of 14,070 lb., it kept an altitude of 4,500 feet for one hour with one engine stopped. With Hispano-Suiza 12 Xirs engines and at 16,500 lb., it maintained a height of 8,400 feet for one hour with one engine stopped. The tests indicate the altitudes at which these supercharged engines are most efficient.

The Seventh

LAST week the Short *Cassiopeia* left Southampton for Marseilles and Alexandria with fifteen passengers and the usual mail for Africa. This boat was launched on the 22nd of last month and was in service on the 27th, and the machines are now being turned out one every fortnight.

Last week, too, it was officially announced in Australia that the Government had agreed to the use of flying boats throughout the journey to Brisbane and Sydney. According to present ideas, this innovation on the Eastern route will involve the use, among other more normal bases, of Lake Gallilee in Palestine, Lake Habaniyih at Baghdad, and Victoria Point instead of Bangkok. In Australia the boats will probably follow the Southern shore of the Gulf of Carpentaria, stopping at the mouth of the Norman River, crossing the Cape York Peninsula, and thereafter flying down the east coast to the terminus

Back into Aviation

AFTER a complete disappearance, as far as aircraft construction is concerned, since pre-war days, the German Ago Company has reappeared with a twin-engined six-passenger feeder-line type. This machine, known as the Kurier, is of low-wing all-metal construction, and has two 240 h.p. Argus engines.

Croydon Airways' Changes

THE chief pilot of Croydon Airways, Ltd., the charter and training company, is now Mr. R. Pierce, and it is probable that he will fly Mr. Lipton's Comet entry in the New York-Paris race next August. Mr. "Timber" Woods, we understand, has severed his connection with the firm.

An Automatic Aerial

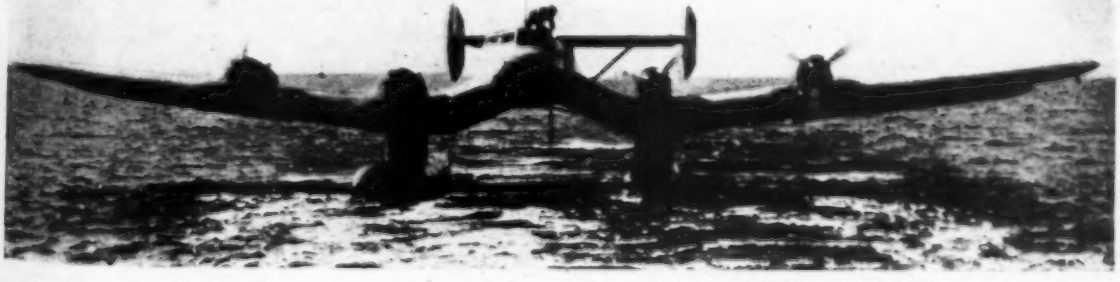
ANYONE who has had the job of winding in a transport machine radio aerial on a service with numerous landings will remember that it is no child's play—and least of all for the internal service pilot who acts as his own operator.

There appears to be nothing to replace the trailing aerial for serious work, but from America we hear of a quick-working, motor-driven aerial reel. Not only is this device, known as the Lear Motoreel, operated by finger-tip control, but it can also vary the length of the aerial to match different frequencies. Any given length can be pre-selected and the Motoreel will let out that length and no more. Warning lights on the dash indicate that the aerial is out and these do not flicker until the weighted "fish" is against the fairlead.

Maybury Junction

ALTHOUGH the Manchester Airport Committee's original £170,000 scheme for Ringway was held up by the Economy Committee at the beginning of last year, a proviso was made that the whole matter should be reconsidered after two years if it was then considered desirable to proceed with the complete scheme. The Airport Committee considers that it is now desirable, though their suggestion was made before the publication of the Maybury Report.

Meanwhile a storm has been rising in the West Riding trade circles because Yeadon airport has been completely ignored in the Maybury Report. There is, however, nothing in the Report calculated to discourage other operators from running branch lines to Yeadon or to any other "snubbed" airport. It is up to the West Riding to show that traffic potentialities exist; so far, the good people who are so upset have shown very little inclination to use the services which actually exist.



FOR THE NORTH ATLANTIC: Some very unusual features can be seen in this head-on view of the Diesel-engined Blohm and Voss Hamburger 139 float-plane which will be used over the North Atlantic. It has been designed for catapult use and has a range of more than 3,000 miles. The maximum speed is 185 m.p.h.

Commercial Aviation

REDUCING RADIO CONGESTION

Some Concrete Proposals and Constructive Criticism : Better Operators and More Machine D/F : The Question of Pay

THE Maybury report recommends a very large increase in aeronautical radio services to cope with increased flying services, but complaints have been made that the waveband allotted to air radio service is already congested. This congestion will soon become acute unless some movement is made towards its reduction.

Much of it is due to inefficient work, both in the air and on the ground, and until the operating standard is raised it will persist. British marine radio operation is of the highest standard, and there is no reason why the aeronautical service should be inferior. It is rather disturbing, in fact, to discover that the majority of tramp steamers have more highly skilled operators than are required for aircraft work.

The examination for aircraft operators is much too easy and should be amended as soon as possible. Holders of existing certificates should be allowed a limited time in which to requalify, say six months, and in the event of failure to do so should lose their "tickets." As a suggested basis for the examination the following might be considered:

Morse speed should be increased to twenty-five words per minute, for both sending and receiving, and 100 per cent. accuracy should be required. A real operating test should be carried out, under adverse conditions and at high speed. A thorough practical and theoretical examination should be instituted on aircraft radio and accessory apparatus, including practical direction-finding and position-fixing. Sufficient elementary navigation should be learnt to enable an operator to set a course from D/F observations and to use a C.D.C. with accuracy and dispatch.

Ground station operators should be at least as highly qualified. Accurate D/F can be carried out in the air by an experienced operator and the use of D/F equipment in aircraft should be encouraged. If the insurance companies were to offer a small reduction in the premiums for machines so fitted I am sure that many would take advantage of the offer.

A very large proportion of all the radio work carried out between ground and air consists of D/F, which could equally well be done on board the machine. Such items as back bearings to check drift and QDM when inward-bound are outstanding examples. It is not suggested that the controlled zone system should be abolished, nor that all D/F should be done in the air, but if half of the present amount of this work could be done upstairs it would help matters considerably.

The two steps suggested would together reduce the present state of congestion by at least 25 per cent., and it could be further reduced by abolishing radio telephony on all the airlines. The wavelength and sidebands allotted to R/T would provide us with two extra communication channels, one of which should be devoted to D/F work between air and ground. The other could very well accommodate a public radiotelegram service between air and ground. This has been talked about for a long time, but congestion has always been raised as an obstacle. It could easily develop into a profitable sideline.

All these things could be done if we had efficient operators, but these are not at present forthcoming. Nor can they be trained in a few weeks or even in a few months, and in view of the long training and high state of efficiency which will eventually be required it will be necessary to offer much higher wages than are at present obtainable. At the present time the standard of payment is scandalous.

CRITIC.

Hope Springs Eternal . . .

CAPT. W. L. HOPE of King's Cup fame, has been appointed technical director of a new company, International Air Freight, Ltd., which he has formed in association with Capt. Woolf Barnato and Messrs. Daniel Metz and W. G. Robson.

Faster to Munich

AT present, the air journey from London to Munich takes a matter of seven hours or more, with a wait of nearly an hour at Cologne and a start at 8.15 a.m. This year, remembering, perhaps, the number of English people who travel to Bavaria and Austria for their holidays, D.L.H. will start a new 4½-hour service to Munich *via* Frankfort. North-east Europe is being brought in by a service from Berlin to Helsingfors.

Real Air Transport

LAST year Canada's air traffic loads were ten times that recorded in 1931, and the air mail alone reached a new record of 1,250,000 lb. Curiously enough, both the mileage and hourage figures for 1936 were a little below those for the year 1931—a fact which suggests that real pay-loads are being carried.

Needless to say, mining loads formed a great proportion of the total, and something like 800 tons were transported from Goldpines, on Lac Seul, to Casummit Lake.

Life-saving

THE sensible idea of using aeroplanes to assist lifeboats has been developed in the Orkneys following the loss of thirty lives in the foundering of the steamer *Johanna Thorden* on the Pentland Skerries.

It is essential for a lifeboat crew, in the midst of a violent storm to obtain some idea of the spot where a steamer's small boat or boats are likely to be found, as otherwise a search is almost bound to prove fruitless.

A more efficient and effective life-saving system for the Orkneys is regarded as essential and it is probable that the matter will affect also some of the islands on the Scottish West coast.

Meanwhile, flying a Highland Airways machine in a 70-m.p.h. blizzard, Mr. Adam Smith landed at North Ronaldshay, on January 27, to bring relief to 160 inhabitants who were in danger of starving. Earlier in the day Kirkwall radio station picked up an S.O.S. from the islanders.

Radio Rationalisation in U.S.A.

A NEW corporation, absorbing four radio and aviation equipment companies has been formed in the U.S. The new organisation will specialise in radio equipment for communications and navigational purposes for the aircraft industry, and will pay particular attention to blind flying and to developing methods for landing under adverse weather conditions.

The Bendix Aviation Corporation is the power behind the combine, which will be known as the Bendix Radio Corporation, and will be staffed with more than a hundred engineers and technicians, and will have plants and laboratories in Chicago, Dayton, Washington, and Oakland.

Newcastle is Ready

WHATEVER may eventually be developed from the recommendations of the Maybury Committee, at least one of the terminal points in the junction system, Newcastle, has received some long-merited attention.

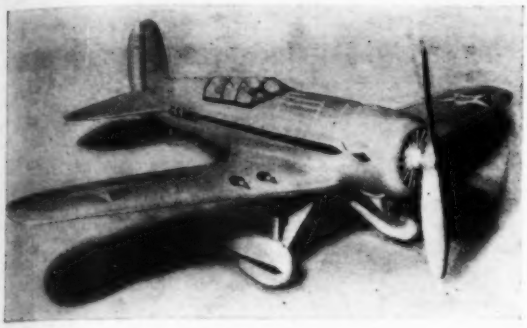
More than eighteen months ago the city's new airport at Woolsington was officially opened by Lord Swinton (then Sir Philip Cunliffe-Lister), and since that time full night-landing equipment has been installed by Clarke, Chapman & Co., of Gateshead, and D/F radio equipment has been made available by the Air Ministry.

The aerodrome has a total area of some 105 acres and the shortest runway is a matter of 700 yards in length. It lies 5½ miles north-west of the city centre and on the main Ponteland road.

The lighting equipment consists of three fixed floodlights, of the totally enclosed three-unit type; a flashing neon location beacon on a 35-foot tower beside the main hangar; a 20ft. by 20ft. wind-tee; boundary lights of cruciform type with a "breakable" fitting in case of accident; and the necessary obstruction lights.

Included in the control tower switchboard—which is also a repeater, the indicator lamps for which are in their correct relative positions—is a wind-tee indicator and a remote control arranged so that the officer in charge can turn it into any desired position in conditions of calm.

As far as the clubhouse part of the services are concerned, there is certain limited bedroom accommodation for the use of visiting pilots and others. During the past year the Newcastle Aero Club has put in 2,200 hours of flying and has trained twenty-seven "A" licence and four "B" licence pilots. Six machines are in use.



MODELS

Competitions During the Coming Season : Important Change in the Wakefield Trophy Rules

By M. R KNIGHT

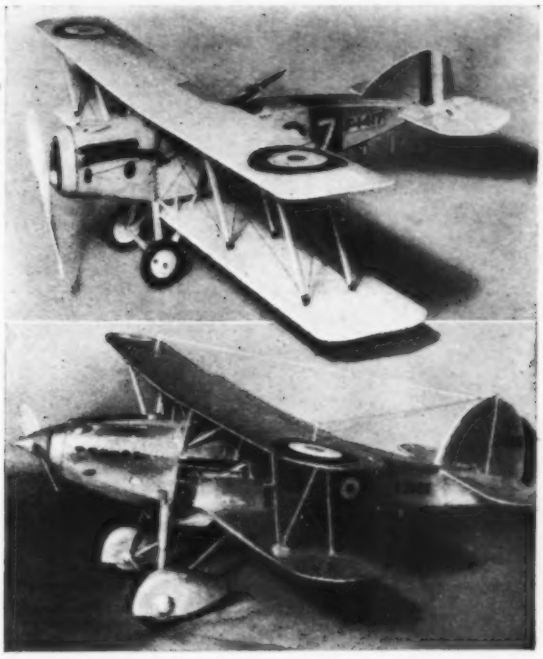
THE S.M.A.E. 1937 Competition Programme, prepared by Messrs. J. C. Smith (hon. competition secretary), R. N. Bullock (hon. technical secretary), and T. Wickens, has now been passed by the Council. Interest will chiefly be centred on the contest for the Wakefield International Cup, which, it will be recalled, was won for Great Britain by Mr. A. A. Judge (T.M.A.C.) in America last June. This year's contest will therefore be held in this country—at Fairey's Great West Aerodrome, on Sunday, August 1. The six members of the British team will be chosen by eliminating trials at Fairey's, on Sunday, July 18. The rules are the same as those of last year, with two exceptions. The total area of the main planes must be 200 sq. in., with a plus or minus tolerance of 10 per cent. The minimum total weight of the model must be 8 oz.

Let us briefly consider the effects of the new weight rule. Originally the contest was open to any type of fuselage model, no weight or area being mentioned. The utmost simplification to secure the least possible weight became the keynote of design, which tended to become stereotyped. At one time about 99.9 per cent. of competition models consisted of a cantilever wing coupled with rubber strip to the top surface of a rectangular-section fuselage.

The advent of balsa construction made it possible to produce a model of 48-in. span weighing about 3 oz. Very beautiful and delicate examples of construction resulted, but in competitions the luck element unfortunately tended to predominate. The highest durations resulted when the ultra-light model was fortunate enough to encounter thermal currents, which enabled it to reach a considerable height and float about indefinitely. More recently attempts have been made to relate victory more closely to technical excellence by the application of rules governing wing-area and weight of model. Last year, models were required to have 190-200 sq. in. of area, and weigh not less than 4 oz.

The reorganised S.M.A.E. has now given a stimulus to progress and consequently an enhanced interest in contests by raising the minimum permissible weight to 8 oz. In addition to giving sound design a better chance of scoring the rule should result in a less fragile type of model, and greater diversity in design. While some constructors may revert to the use of spruce or even birch, the majority will probably prefer to use stouter sections of balsa. Having in mind the higher speeds entailed in the new weight rule, they will be enabled to incorporate a greater degree of streamlining, without fear of the structure weight reaching an impracticable figure. Several low-wing and mid-wing machines, with wings neatly faired into an oval or multi-sided fuselage, are already being planned, and this year's Wakefield Contest should, from the technical point of view, prove the most interesting yet.

To assist intending competitors, two Wakefield Development Contests, in which individuals will compete under the Wakefield formula, will be held on clubs grounds on April 18 and June 13.



REALISM in flying scale models : Three prize-winners in the senior section of the constructional competition recently held by Hamleys, of Regent Street, London. Trophies were presented by Major C. J. Galpin, D.S.O., Deputy Director fo Civil Aviation. The Hawker Super Fury (first prize) was built by Mr. D. J. E. Jackson ; the Lockheed P.23 (second prize) by Major Gatehouse, M.C. ; and the Bristol Fighter (third prize) by Mr. H. J. Pomeroy.

Seaplanes

THE Seaplane Contest for the Lady Shelley Cup will again be held at Danson Park, Welling, Kent, the date being June 27. Certain enthusiasts had hoped that use would be made of the portable launching tank produced last year by Mr. H. Fialko, Competition Secretary of T.M.A.C. ; in fact, quite a lively tank *v.* lake controversy has been raging behind the scenes !

It is fitting that acknowledgment should here be made of the services rendered by the North Kent Model Aircraft Society in connection with previous contests.

Other 1937 Fixtures

OTHER items from the 1937 fixture list, which is given herewith, will be referred to in subsequent "Models" pages. Decentralised contests (those held on the grounds of clubs affiliated to the S.M.A.E.) are marked "D."

April 4, GAMAGE CUP (D), any type of rubber-driven model, average of 3 R.O.G. flights.
April 18, PILCHER CUP (D), Wakefield Development No. 1.
May 9, "MODEL ENGINEER" No. 1 CUP (D), gliders, wing area 200-300 sq. in., average of 3 flights, catapulted *from substantially level ground*.
May 30, "FLIGHT" CUP, speed, ground to be announced.
June 13, WESTON CUP (D), Wakefield Development No. 2.
June 20, rubber-driven AUTOGIROS, average of 3 R.O.G. flights, Fairey's Aerodrome, at "Northern Heights" Gala Day.
June 27, LADY SHELLEY CUP, Seaplanes, Danson Park.
July 4, C.S.C.A. CUP, (D), Scale Models, 1 in. and 1½ in. to the ft.
July 18, WAKEFIELD ELIMINATION TRIALS, Fairey's.
August 1, WAKEFIELD CUP, Fairey's.
August 2, SIR JOHN SHELLEY CUP, Power-driven models, 11 a.m., and BOWDEN INTERNATIONAL TROPHY, Power-driven models, 2 p.m., Fairey's.
August 15, S.M.A.E. CUP, National Contest, Fairey's.
September 5, BIPLANES (D), *Minimum* total area 200 sq. in.
September 19, FARROW SHIELD (D), Inter-Club.

A copy of the fixture list, giving full rules, will be sent free to those interested if a stamped addressed envelope is posted to Mr. J. C. Smith, 1, Treen Avenue, Barnes, London, S.W.13.

(*Continued overleaf.*)

That most popular event, the Gala Day organised by the Northern Heights Model Flying Club, will be held at Fairey's Great West Aerodrome (by permission of Mr. C. R. Fairey , on June 20. The main purpose is to muster the maximum number of models and enthusiasts (with or without models), but attractive contests and prizes are promised, including a special team competition for affiliated clubs.

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The S.M.A.E. Indoor Flying Meeting at the Albert Hall, announced for February 2, is unavoidably postponed until February 8.

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An ideal medium for a first attempt at a flying scale model will be found in the kit of materials for the Hawker Hurricane, offered at 4s. 10d., including postage, by Premier Aeromodel Supplies, 22, Hornsey Rise, London, N.19. Formers, ribs, etc., are very clearly printed on balsa sheet. Full-size drawings, roughed-out airscrew, and celluloid for windows are included, but not glue or dope. The wing-span is 20in. A Fairey Battle kit will shortly be available at the same price. Incidentally it is interesting that six hundred American firms are understood to be turning out scale model kits, and that the Cleveland people (who are responsible for the Hurricane) claim a yearly output of four million—60 per cent. of the total.

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The annual rally of makers of Skybird 1/72nd scale models takes place at the Jehangir Hall, Imperial Institute, South Kensington, on April 2.

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A models club has been formed in Deal and district under the patronage of Sir Gerald Woods-Wollaston. Particulars are obtainable from Mr. Dennis McCarthy, 9, High Street, Deal.

AIR DEFENCE

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most solemnly promised parity, they had not nearly approached it, nor would they get it during 1937, and he doubted whether they would have it during 1938. He asserted the truth of the figure of 1,500 first-line aeroplanes which, in the debate in November, he suggested Germany had, and said that she had considerably more now. Possibly the explanation of the difference in the number arrived at lay in the fact that he always took German squadrons as being composed of 12 aeroplanes, although three in each squadron were nominally in reserve. One hundred and fifty squadrons of 12 machines each gave a total of 1,800 machines, and it was clear that our figure, when 100 squadrons were complete, would be barely half that.

Rear-Admiral Sir Murray Sueter said he had visited the Short, Bristol and Gloster factories lately, and he thought the Bristol factory made a big target, being built over five acres of land. It might be better to build small units scattered over the country. Also, factories should be placed as far North as possible because if hostile machines had to cross a large stretch of our territory, we were more likely to bring them down. He confirmed that five months ago Germany had 1,800 first-line aircraft; they now had more. Sir Murray also called attention to the fact that the defence of London is divided between the Army and the Air Force, and said it was high time it was put under the Air Ministry. [This is a point which has frequently been emphasised in *Flight*.—ED.]

Lt. Cmdr. Fletcher pleaded for the allocation of more money for the Air Force, pointing out that if we had to rely on retaliation for air attack, there would be no chance of building up superiority after a surprise attack had informed this country that we were at war. Parity was not enough; we must have superiority.

Power of the Future

INCLUDING such cryptic titles as Dagger E.108, Aquila A.E. (3M) and A.E. (3S); Perseus Pr.E. (1S), VI, VIII, X, XI, XII and XV; Pegasus (special) and XIV, XV, XVII, XVIII and XXII; Kestrel (special) and K.V.26; and Merlin II and M.S., a list of the latest aero-engines built for the Air Ministry is as appalling in its complexity as it is reassuring in its length. But the inventory given above (to which might be added the Tiger VIII, Hercules I and Mercury XI and XII) by no means represents all the shots in our locker, for the very latest engines are, by official decree, unmentionable.

The Dagger E.108 is a fully supercharged model, presumably a development of the Mk. II Dagger which, in turn, is similar to the "III" specified for the Service Hectors.

The two Aquilas represent advanced forms of the smallest of the three Bristol sleeve-valve models. It may be recalled that the Vickers Venom mounts an A.E. (3S).

Of the Perseus types the Pr.E. (1S) and X are fully supercharged, whereas the remainder are "blown" up to something like 6,000 feet. The VI, it has just been revealed, gives 745 h.p. at 6,500 feet.

Most likely the Pegasus (special) is the power plant of the Bristol 138a, which holds the world's altitude record; the Kestrel (special) is probably intended for a similar machine.

The bevy of "Pegasae" includes two models with two-speed blowers (XVII and XVIII) and a new moderately supercharged type, the XXII, delivering 870 h.p. at 5,500 feet. The XIV and XV are "full-blown," the latter being specified for the Handley Page Hampden medium bomber.

The introduction of the moderately supercharged Merlin suggests even wider application for this our newest liquid-cooled unit. The Mercuries, the XI and VII, are also "M.S."

Siddeley's contribution, the Tiger VIII, has a two-speed supercharger and is fitted in the new A.W. medium bomber.

The two-row, sleeve-valve Hercules has already been introduced to readers of *Flight*.

Patents and the B.I.F.

IN view of the proximity of the British Industries Fair, it is important that firms exhibiting new ideas and inventions should realise that the mere fact of the B.I.F. being certified by the Board of Trade to be an industrial exhibition recognised for the purposes of the Patents and Designs Acts does not in itself enable exhibitors to show unprotected inventions without prejudicing their rights therein.

It is essential before exhibiting to file a description of an invention in the prescribed form at the Patent Office.

Kings Patent Agency, Ltd., who offer the above reminder, issue a handbook on patents and trade marks which will be sent free to interested enquirers, and which explains the formalities required.

Messier Products

IT may be remembered that in *Flight* of January 14 there appeared a note on the activities of the Messier Aviation Engineering Co., Ltd. The company now state that they did not, perhaps, make it clear that at the present moment their establishment is confined to the office at 175, Piccadilly, and does not include a works at Bristol.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

AMERICAN AIRCRAFT AND ENGINE SERVICE, LTD., was registered as a private company on January 16, with a nominal capital of £1,000 in 1,000 shares of £1 each. Objects: To manufacture and deal in all forms of British and foreign aircraft, engines, accessories and components, etc. The directors are: Frank W. Grant (director of Surrey Flying Services, Ltd.); Wm. G. Macdonald (director of Surrey Flying Services, Ltd.); Geo. Birkett (director of Birkett Air Service, Ltd.); Leslie L. Irvin (director of Irving Air Chute (Great Britain), Ltd.) and Brian S. Allen (director of Brian Allen Aviation, Ltd.). The registered office is 4, Bloomsbury Place, London, W.C.1.

INTERNATIONAL AIR FREIGHT, LTD., was registered as a private company on January 22, with a nominal capital of £50,300 in 50,000 6 per cent. cumulative participating preference and 300 ordinary shares of £1 each. The objects are to establish, maintain and work airlines; to manufacture and deal in aircraft, to provide and maintain hangars, garages and aerodromes, etc. The directors are: Daniel Metz, Walter L. Hope (director of Air Taxis, Ltd.), Woolf Barnato (director of Bentley Motors (1931), Ltd.), Walter G. Robson (director of Greville Estates, Ltd.) Walter L. Hope is the first technical director and Walter G. Robson the first commercial director. Solicitors: Wild, Collins and Crosse, Kennan's House, Crown Court, Cheapside, London, E.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

(Published January 21, 1937.)

17893. FLOREZ, L. DE: Apparatus for facilitating blind flying (458,812).
18256. WRIGHT, G. M., and MCLELLAN, A.: Altimeters for aircraft (458,780).
18409. VICKERS (AVIATION), LTD., PIERSON, R. K., and BEWSHER, J.: Construction of aircraft wings (458,789).
24158. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and ANDERSON, G. G.: Supercharged internal combustion engines (458,611).
7052. LEVASSEUR CONSTRUCTIONS AERONAUTIQUES, P.: Variable-pitch aeroplane propeller (458,638).
11493. BAYNES, L. E., and ABBOTT, LTD., E. D.: Aircraft having variable incidence wings (458,751).
18751. SOC. ANON. SOLEX.: Floatless carburetters, particularly those of engines for aircraft (458,659).
30645. BARKER, G. G. (Bendix Aviation Corporation): Shock-absorbers (458,